TOSHIBA

No. MIIUS0017EA

DICOM
CONFORMANCE STATEMENT
FOR
DIAGNOSTIC ULTRASOUND SYSTEM

PowerVision MODELS SSA-370A/390A
(PowerView MODEL UIDM-400A),

AND
Nemio MODEL SSA-550A
(DMU MODEL UIDM-550A)

TOSHIBA CORPORATION

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1 Introduction

This document is a DICOM Conformance Statement for Toshiba's Data Management Unit (UIDM-400A PowerView more recent than Software Version 3.2 ER0001, and UIDM-550A DMU more recent than Software Version 1.2 ER0001). It is intended to provide the reader with the knowledge of how to integrate this product within a DICOM compliant hospital network. It details the DICOM Service Classes, Information Objects, and Communication Protocols which are supported by this product as follows:

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

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

1.1 References

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

1.2 Definitions

- **Association Establishment** - An Association Establishment is the first phase of communication between two DICOM Application Entities. The AEs use the Association Establishment to negotiate how data will be encoded and the type of data to be exchanged.
- **Called Application Entity Title** - The Called AE Title defines the intended receiver of an Association.
- **Calling Application Entity Title** - The Calling AE Title defines the requestor of an Association.
- **DICOM Message Service Element (DIMSE)** - A DIMSE defines the services and protocols utilized by an Application Entity to exchange messages.
- **Information Object Definition (IOD)** - An IOD is a data model which is an abstraction of real-world information. This data model defines the nature and attributes relevant to the class of realworld objects represented.
- **Service Class Provider (SCP)** - A Service Class Provider plays the "server" role to perform operations and invoke notifications during an Association. An example of a Storage Service Class Provider would be an image storage device. In this case, the image storage device is storing the image that was sent by a Service Class User.
- **Service Class User (SCU)** - A Service Class User plays the "client" role to invoke operations and perform notifications during an Association. An example of a Storage Service Class User would be an image acquisition device. In this case, the image acquisition device will create and send a DICOM image by requesting that a Service Class Provider store that image.
- **Service/Object Pair (SOP) Class** - A SOP Class is defined by the union of an Information Object Definition and a set of DIMSE Services. A DICOM Application Entity may support one or more SOP Classes. Each SOP Class is uniquely identified by a SOP Class UID.

- **SOP Instance** - A specific occurrence of a Information Object.
- **Transfer Syntax** - The Transfer Syntax is a set of encoding rules that allow DICOM Application Entities to negotiate the encoding techniques (e.g., data element structure, byte ordering, compression) they are able to support. The Transfer Syntax is negotiated during Association Negotiation.
- **Unique Identifier (UID)** - A Unique Identifier is a globally unique, ISO compliant, ASCII-numeric string. It guarantees uniqueness across multiple countries, sites, vendors, and equipment.
- **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.
- **DICOM File Service** - 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 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.
- **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.
- **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 is 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 Creator** - An Application Entity that creates the DICOMDIR File (see section 8.6) and zero or more DICOM Files.
- **File-set Reader** - An Application Entity that accesses one or more files in a File-set.
- **File-set Updater** - 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.
- **DICOM File Format** - 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.
- **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.
- **Media Storage Model** - The DICOM Media Storage Model pertains to the data structures used at different layers to achieve interoperability through media interchange.
- **Physical Media** - A piece of material with recording capabilities for streams of bits. Characteristics of a Physical Media include form factor, mechanical characteristics, recording properties and rules for recording and organizing bit streams in accessible structures.

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
- FSR 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 service engineer 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

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

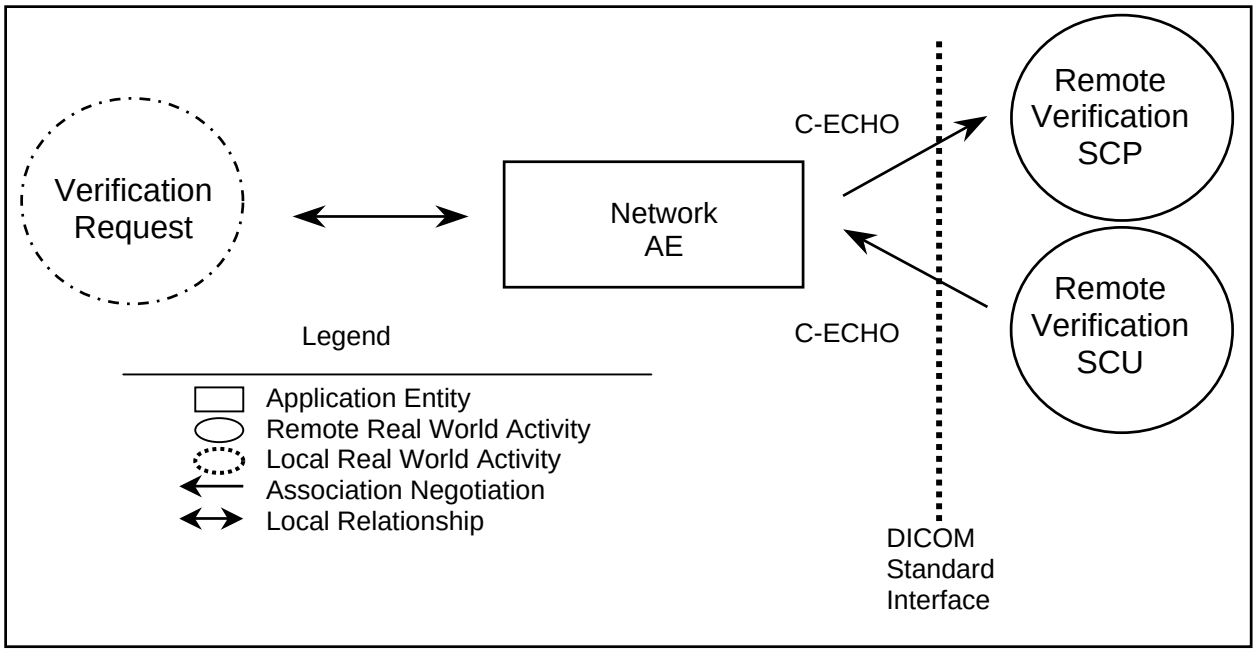

Figure 1

2.1.2 Functional Definitions of Application Entities

Network AE is used to verify that Remote DICOM devices are active on the network and allows Remote DICOM devices to verify that 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 acts as the SCU and the 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 Network AEs presence.

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.

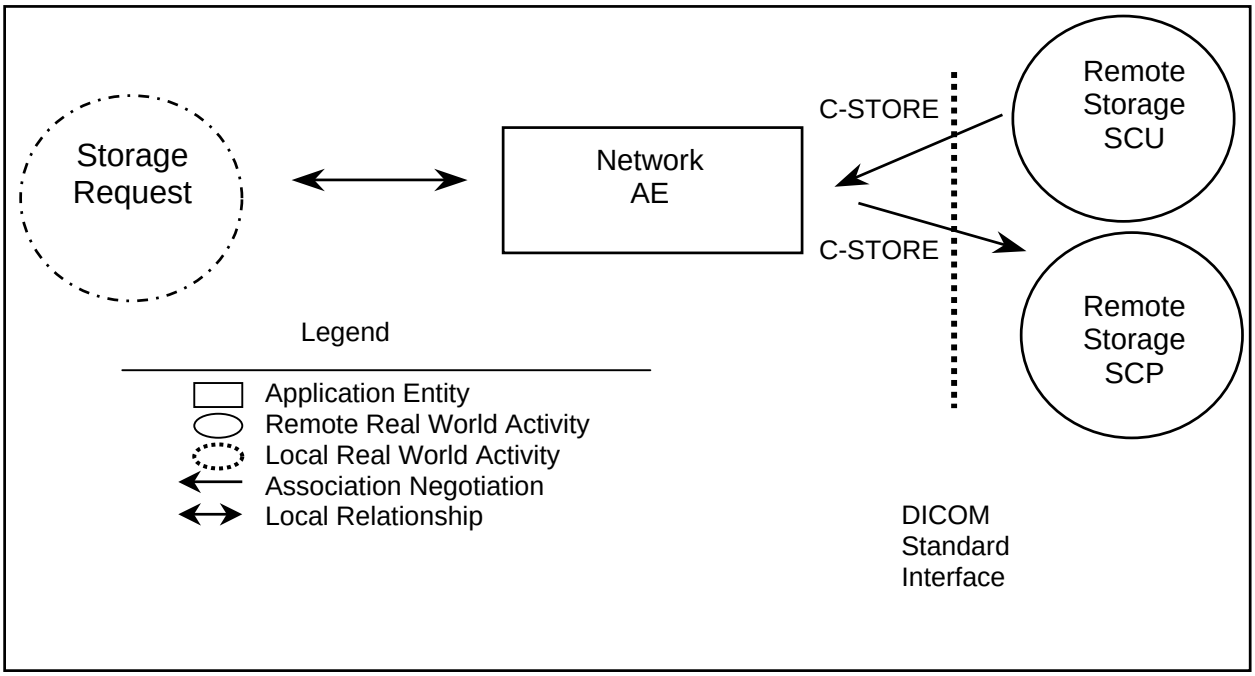

Figure 2

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 US, and US Multi-frame Image Information Objects.
- Establishes DICOM association with the Remote DICOM device.
- Stores DICOM US, and US Multi-frame Information Objects on the Remote DICOM device.
- Accepts establishment of DICOM association from the Remote DICOM device.
- Accepts Storage of DICOM US, and US Multi-frame Image Information Objects from the Remote DICOM device.

2.2.3 Sequence of Real World Activities

2.2.3.1 Features

- The operator requests transfer of studies/images to a server after selecting the target studies/images 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 studies or images transmit fails, Network AE displays an error message and asks the operator to attempt it or to cancel a DICOM service during turning on electricity. After restarting the system, this setting will be back to a default.
- Network AE acts as the SCU and the SCP 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.

An image is transferred from the Remote DICOM device without any operation.

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.

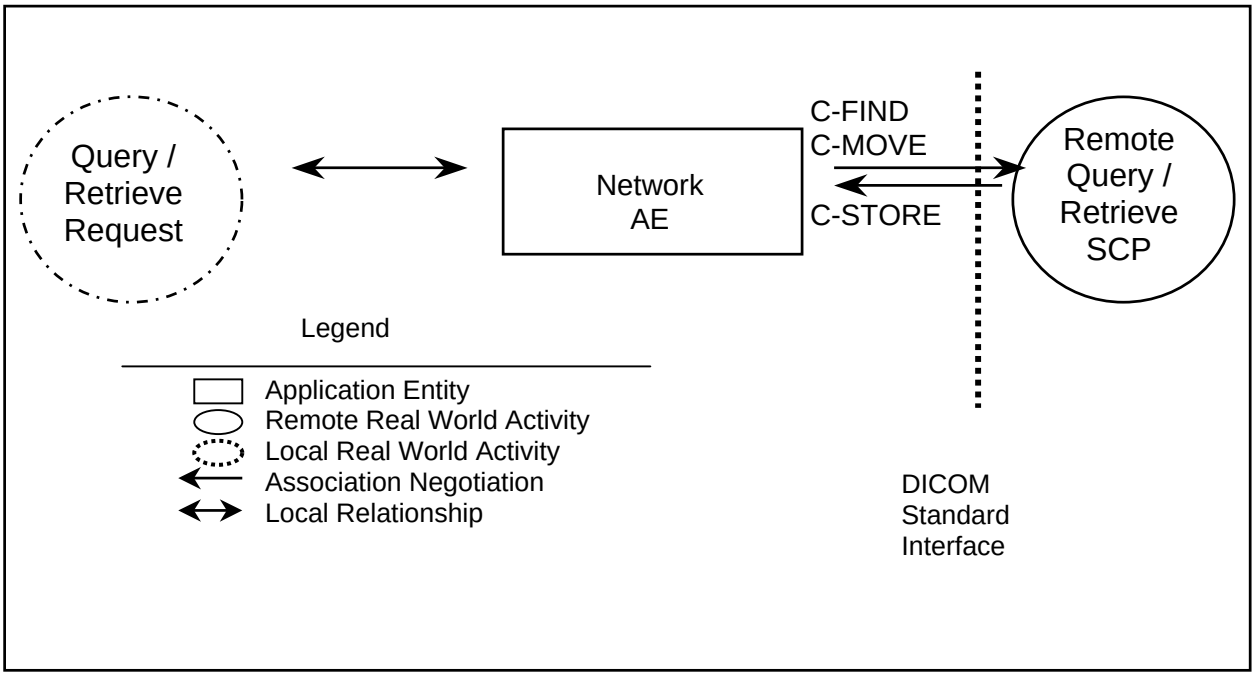

Figure 3

2.3.2 Functional Definitions of Application Entities

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

- Establishes DICOM association with the Remote DICOM device.
- Performs Query of Patient/Study Information Objects from the Remote DICOM device.
- Performs Retrieve of DICOM US, and US Multi-frame Information Objects from the Remote DICOM device.

2.3.3 Sequence of Real World Activities

2.3.3.1 Features

- The operator requests to query studies.
- The operator requests to retrieve the queried studies from the Study List.
- Patient Name, Patient ID, and Accession Number can be set as a filter.
- When the study or images query and retrieval fails, Network AE displays an error message and asks the operator to attempt it or to cancel a DICOM service during turning on electricity. After restarting the system, this setting will be back to a default.
- 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

Network AE implementation acts as the SCU for the Print Service.

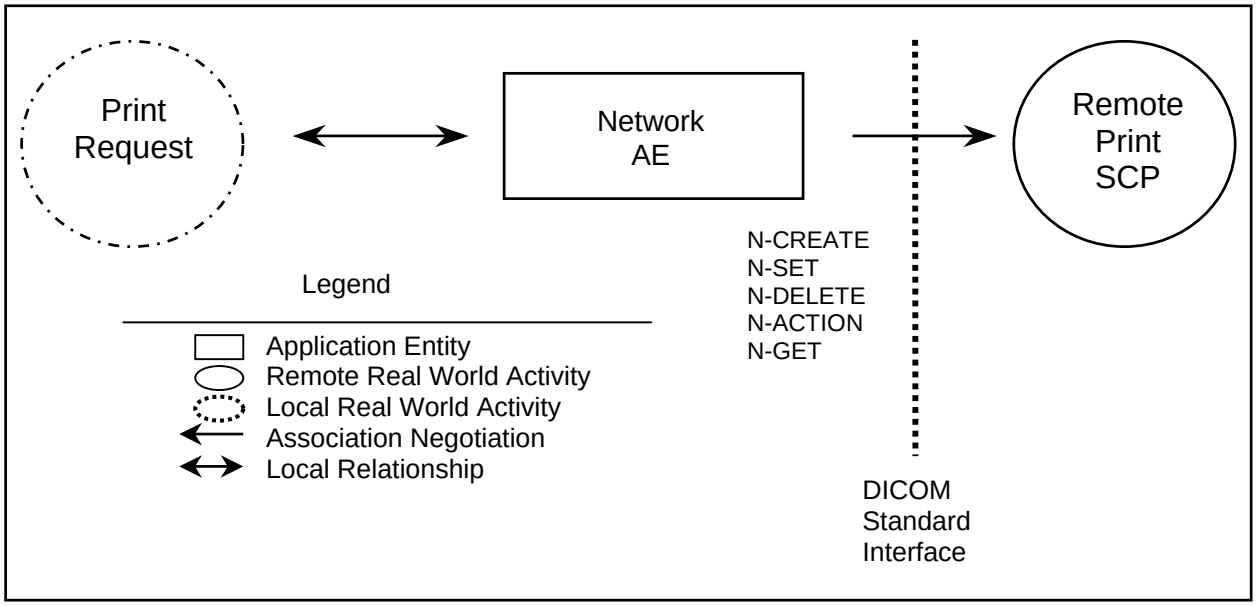

Figure 4

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 association with the Remote DICOM devices.
- 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 a printing of images after selecting the target studies/images from the Study List or Image List.
- The operator requests the printing of images immediate to the default server when the feature is set up in advance.
- Print requests are placed in a queue and are executed in the background.
- When studies or images printing fails, Network AE displays an error message and asks the operator to attempt it or to cancel a DICOM service during turning on electricity. After restarting the system, this setting will be back to a default.

- 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 studies to be printed.
Step 2: Network AE displays the image to be printed.
Step 3: 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.

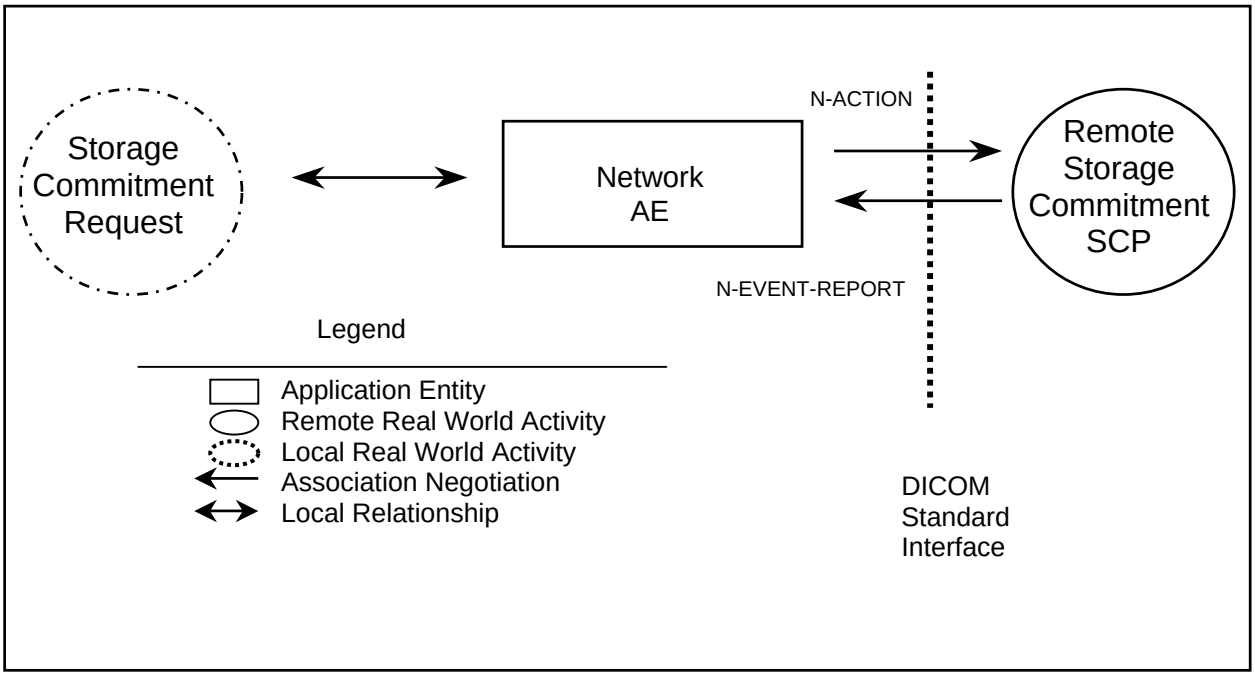

Figure 5

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 requests 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

- Network AE recognizes a procedure fails either a failure of storage or a failure of commitment.
- When the study or images transmit or commitment fails, Network AE displays an error message and asks the operator to attempt it or to cancel a

DICOM service during turning on electricity. After restarting the system, this setting will be back to a default.

- Commitment is performed automatically.
- Network AE acts as the SCU for Storage Commitment.

2.5.3.2 Operation

The operations for manual image transfer are described below:

Operation 1

Step 1: Select the study to be transferred.
Step 2: Request transfer.

Operation 2

Step 1: Select images 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.

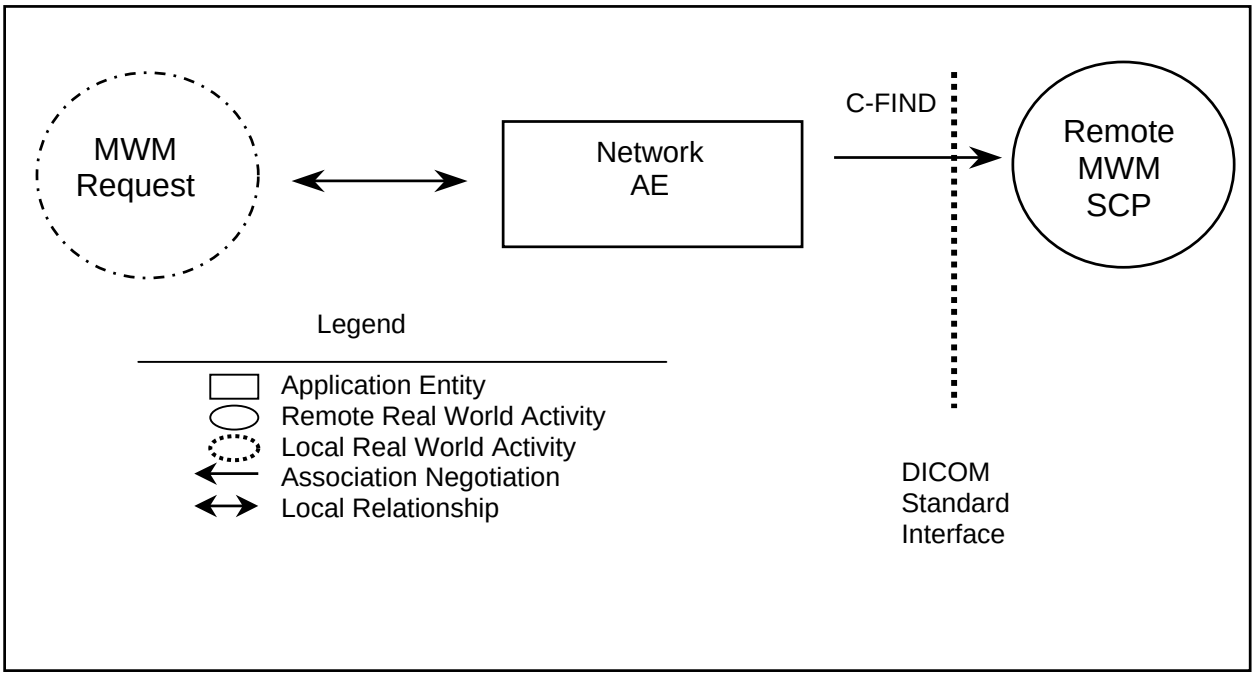

Figure 6

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.
- Performs request of DICOM MWM Objects from 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, Network AE displays an error message and asks the operator to attempt it or to cancel a DICOM service during turning on electricity. After restarting the system, this setting will be back to a default.
- 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.

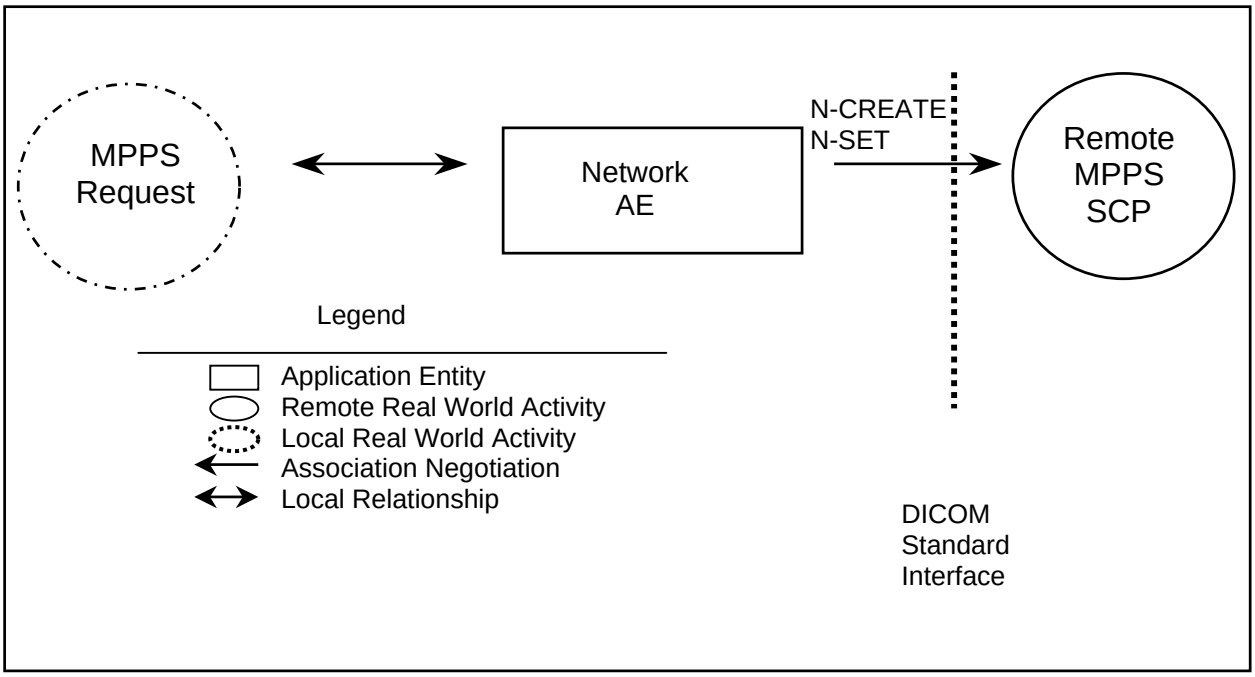

Figure 7

2.7.2 Functional Definitions of Application Entities

Network AE is used to transmit events such as the start of the study and the end of the 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 of the study and the end of the study.
- When signal transition fails, Network AE displays an error message and asks the operator to attempt it or to cancel a DICOM service during turning on electricity. After restarting the system, this setting will be back to a default.
- Network AE is an SCU for the MPPS.

2.7.3.2 Operation

- Network AE performs MPPS functions automatically. The study's status is transmitted to a Remote DICOM device.

2.8 MOD Medium

Medium AE 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. Medium AE 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

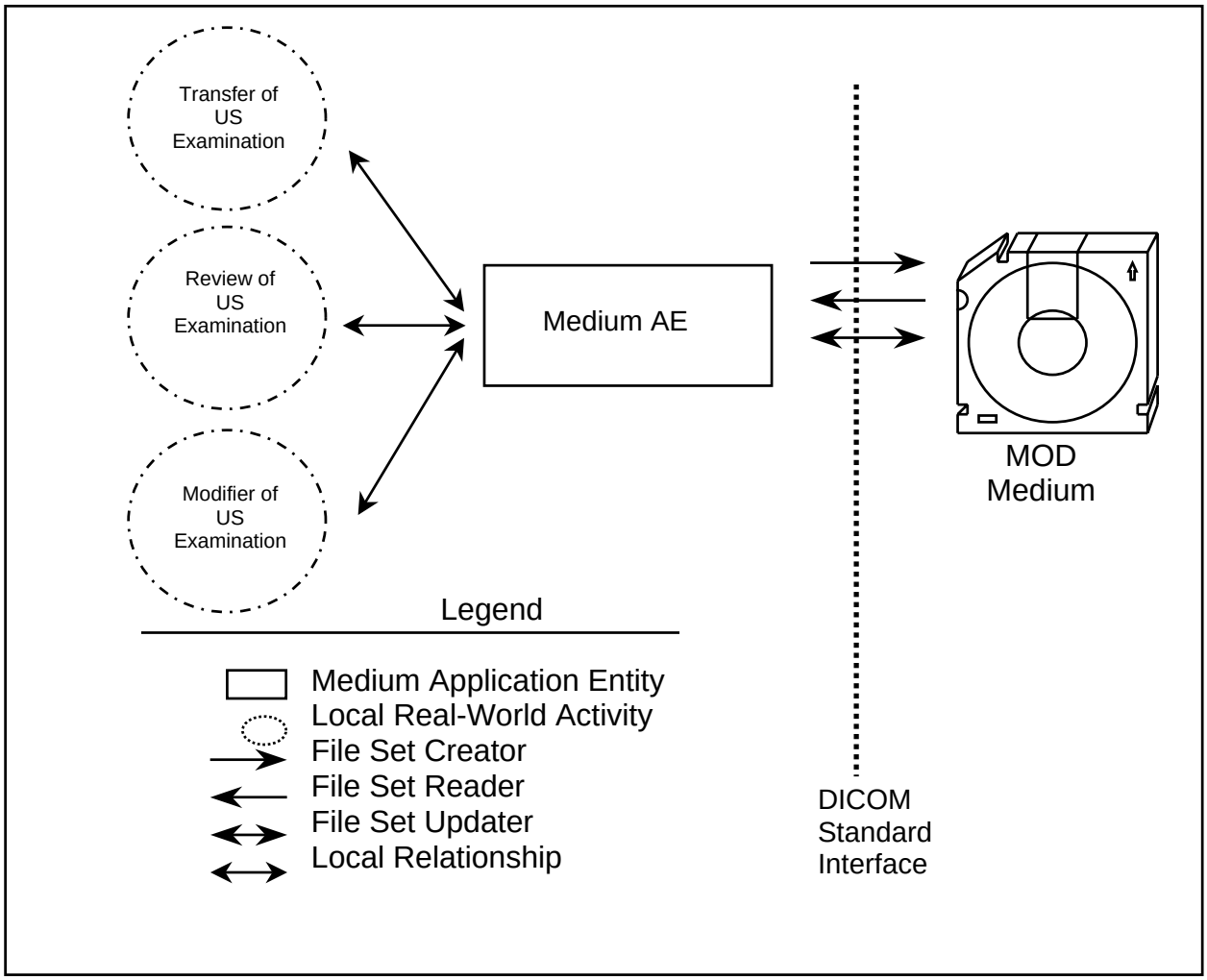

Figure 8

2.8.2 Functional Definitions of Application Entity

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 US, and US Multi-frame Information Objects.
- Creates a DICOMDIR file that represents the contents of the DICOM US, and US Multi-frame Information Objects to be recorded.
- Records DICOM US, and US Multi-frame Information Objects from local storage to MOD media.
- Reads the DICOMDIR file that represents the contents of the data as recorded.

- Displays the ordered list of studies/images, identifying information.
- Reads the selected studies/images from MOD media and displays them on the monitor of the Medium AE.
- Reads the File-set of MOD media and writes it to the local storage of Medium AE.
- Modifies the DICOMDIR file and the studies/images.

2.8.3 Sequence of Real World Activities

Medium AE will not perform updates before the directory information of DICOMDIR has been completely read.

2.8.3.1 Features

- The operator requests storage of studies/images to MOD media after selecting studies from the Study/Image List.
- The operator requests immediate and automatic storage of an image after capture.
- The operator requests retrieval of studies/images from MOD media to the local disk.
- Storage requests are placed in a queue and are executed in the background.
- When the storage of studies/images fails, Medium AE displays an error message and asks the operator to attempt it.

2.8.3.2 Operations

The operations for manual Transfer are described below:
Operation
Step 1: Display the Study/Image List.
Step 2: Select studies/images.
Step 3: Request transfer.

The operation for Review is described below:
Operation
Step 1: Display the Study/Image List.

The operations for Modification are described below:
Operation
Step 1: Display the Study/Image List.
Step 2: Select studies/images.
Step 3: Request delete.

3 AE Specifications

3.1 Network AE Specification

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

Table 1

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1
Patient/Study Only Query/Retrieve information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1
Patient/Study Only Query/Retrieve information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2
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

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

Table 2

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1

3.1.1 Network AE 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 3

DICOM V3.0 Application Context	1.2.840.10008.3.1.1.1

3.1.1.2 Number of Associations

Network AE (initiation) initiates 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 4

System	Implementation Class UID	Implementation Version Name
UIDM-400A PowerView	1.2.124.113532.1.1	DICOMIT+<Software version>
UIDM-550A DMU	1.3.51.0.0.1999.2.6	DICOMIT+<Software version>

3.1.2 Association Initiation by Real World Activity

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

- Verification
  Verify that a Remote DICOM device is present on the network.
- Storage
  Create and store a US, or US Multi-frame image to a Remote DICOM device.
- Query/Retrieve
  Query information to a Remote DICOM device. Retrieve a US, or US Multi-frame image from a Remote DICOM device.
- Print
  Request print images to a Remote DICOM device.
- Storage Commitment
  Commit to store a US, or US Multi-frame image to a Remote DICOM device.
- MPPS
  Send MPPS information to a Remote DICOM device.
- MWM
  Retrieve MWM information from 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 Network AE. If the process successfully establishes an association with a Remote DICOM device, it will send the C-ECHO request via the open association to verify that the Remote DICOM device is responding to DICOM messages.

3.1.2.1.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for Verification.

Table 5

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 8 .

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 that has been initiated. If the C-STORE response from the remote Application contains an error status, the association is aborted.

3.1.2.2.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for Storage.

Table 6

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6	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
		RLE Lossless Image Compression	1.2.840.10008.1.2.5	SCU	None
		JPEG Lossy, Baseline Sequential with Huffman Coding (Process 1)	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
		RLE Lossless Image Compression	1.2.840.10008.1.2.5	SCU	None
		JPEG Lossy, Baseline Sequential with Huffman Coding (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
Ultrasound Multi-frame Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3	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

(retired)		RLE Lossless Image Compression	1.2.840.10008.1.2.5	SCU	None
		JPEG Lossy, Baseline Sequential with Huffman Coding (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	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
		RLE Lossless Image Compression	1.2.840.10008.1.2.5	SCU	None
		JPEG Lossy, Baseline Sequential with Huffman Coding (Process 1)	1.2.840.10008.1.2.4.50	SCU	None

3.1.2.2.2.1 SOP Specific 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 9 ,10 .

3.1.2.3 Real World Activity - Query/Retrieve SCU

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 7

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name List**	**UID List**		
Patient/Study Only Query/Retrieve information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	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
Patient/Study Only Query/Retrieve information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2	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 11 .

3.1.2.4 Real World Activity – Print SCU

The print management SCU invokes print management DIMSE services to transfer images from the Network AE to the Remote DICOM device AE and to print the images 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 8

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 9

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

If the response from the remote application contains a status other than Success or Warning, the association is aborted.

3.1.2.4.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for Print.

Table 10

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended
Name	**UID**	**Name List**	**UID List**		**Negotiation**
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 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 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
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 Application conforms to the definition of a Print SCU in accordance with the DICOM Standard.

DIMSE and attributes are described in chapter 12 .

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 studies/images storage to a Remote DICOM device.

3.1.2.5.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for Storage Commitment.

Table 11

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended
Name	**UID**	**Name List**	**UID List**		**Negotiation**
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 confirmation of storage commitment N-EVENT-REPORT not only per image, but also per study.

DIMSE and attributes are described in chapter 13 .

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 concerning a Remote DICOM device.

3.1.2.6.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for MWM.

Table 12

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**			**Extended**
Name	**UID**	**Name List**	**UID List**	**Role**	**Negotiation**
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
		Explicit VR Big Endian	1.2.840.10008.1.2.2	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 14 .

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 ends.

3.1.2.7.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for MPPS.

Table 13

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended
Name	**UID**	**Name List**	**UID List**		**Negotiation**
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 15 .

3.1.3 Association Acceptance by Real World Activity

Network AE accepts passive association at any activated time.

- Verification
  Verify from a Remote DICOM device if Network AE is present.
- Storage
  Store a US, US Multi-frame image from a Remote DICOM device.
- Commitment to storage
  Accept informing of a Commitment to storage image from a Remote DICOM device.

3.1.3.1 Real World Activity – Verification SCP

3.1.3.1.1 Associated Real World Activity

The associated Real World Activity is a C-ECHO request initiated by a Remote DICOM device. If the process successfully establishes an association with a Network AE, it will send the C-ECHO request via the open association to verify that Network AE is responding to DICOM messages.

3.1.3.1.2 Proposed Presentation Contexts

Network AE supports the following Presentation Contexts for Verification.

Table 14

Presentation Context Table

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

3.1.3.1.2.1 SOP Specific Conformance Statement

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

DIMSE and attributes are described in chapter 8 .

3.1.3.2 Real World Activity – Storage SCP

3.1.3.2.1 Associated Real World Activity

Network AE will issue a Storage SCP when a Remote Real World Activity wishes to send studies/images.

3.1.3.2.2 Presentation Context Table

Network AE supports the following Presentation Contexts for Acceptance Storage.

Table 15

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended
Name	**UID**	**Name List**	**UID List**		**Negotiation**
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		RLE Lossless Image Compression	1.2.840.10008.1.2.5	SCP	None
		JPEG Lossy, Baseline Sequential with Huffman Coding (Process 1)	1.2.840.10008.1.2.4.50	SCP	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	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		RLE Lossless Image Compression	1.2.840.10008.1.2.5	SCP	None
		JPEG Lossy, Baseline Sequential with Huffman Coding (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

(Retired)		RLE Lossless Image Compression	1.2.840.10008.1.2.5	SCP	None
		JPEG Lossy, Baseline Sequential with Huffman Coding (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		RLE Lossless Image Compression	1.2.840.10008.1.2.5	SCP	None
		JPEG Lossy, Baseline Sequential with Huffman Coding (Process 1)	1.2.840.10008.1.2.4.50	SCP	None

3.1.3.2.2.1 SOP Specific Conformance Statement

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

DIMSE and attributes are described in chapter 9 , 10 .

Level of support is “0 – level 0 SCP”.

Network AE allows to retrieve images of this system.

3.1.3.3 Real World Activity – Commitment SCU

3.1.3.3.1 Associated Real World Activity

Network AE receives commitment signal of studies/images storage from a Remote DICOM device.

3.1.3.3.2 Presentation Context Table

Network AE accepts reception of N-EVENT-REPORT as Storage Commitment and supports the following Presentation Contexts for Storage Commitment.

Table 16

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended
Name	**UID**	**Name List**	**UID List**		**Negotiation**
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

3.1.3.3.2.1 SOP Specific Conformance Statement

The Application conforms to the definition of a Storage Commitment SCU in accordance with the DICOM Standard.
DIMSE and attributes are described in chapter 13 .

3.2 Medium AE Specification

Medium Activity: Medium AE provides Standard Conformance to the following DICOM SOP Classes:

Table 17

SOP Class Name	SOP Class UID
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

3.2.1.1 Real World Activity

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

3.2.1.1.1 Media Storage Application Profile

AUG-US-ID-MF-MOD640 is replaced from 130mm MOD to 90mm MOD.

Table 18

Supported Application Profiles	Real World Activity	Roles
AUG-US-ID-MF-MOD640	Transfer of US Examination	FSC
	Modification of US Examination	FSU
	Review of US Examination	FSR

3.2.1.1.1.1 Abstract and Transfer Syntaxes– Removable Media

The following list applies when Medium AE is configured to support DICOM Removable Media:

Table 19

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
DICOM Media Storage Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian Uncompressed	1.2.840.10008.1.2.1
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian Uncompressed	1.2.840.10008.1.2.1
		RLE Lossless Image Compression	1.2.840.10008.1.2.5
		JPEG Lossy, Baseline (Process 1)	1.2.840.10008.1.2.4.50
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian Uncompressed	1.2.840.10008.1.2.1
		RLE Lossless Image Compression	1.2.840.10008.1.2.5
		JPEG Lossy, Baseline (Process 1)	1.2.840.10008.1.2.4.50

Medium AE supports the following Photometric Interpretation and Transfer Syntax pairs.

Table 20

Photometric Interpretation Value	Transfer Syntax	Transfer Syntax UID
RGB	Uncompressed	1.2.840.10008.1.2.1
YBR_FULL_422	JPEG Lossy	1.2.840.10008.1.2.4.50
YBR_FULL	RLE Lossless Image Compression	1.2.840.10008.1.2.5

4 Communications Profiles

4.1 Supported Communication Stacks

This system provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.2 OSI Stack

Not applicable to this product.

4.3 TCP/IP Stack

This system uses the TCP/IP stack from the computer system on which it is running.

4.3.1 API

Not applicable to this product.

4.3.2 Physical Media Support

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

4.4 Point to Point Stack

Not applicable to this product.

5 Extensions/Specialization/Privatization

The additional Type 3 Attributes are intended for TOSHIBA internal use, therefore PowerView/DMU expects the Service Class Provider to simply ignore them, may be Private Attributes.

6 Configuration

The Configuration Utility allows the service engineer to set and maintain configuration parameters of local and Remote DICOM application entities.

The parameters are as follows:

Table 21

Parameter			Default
Local	AE Title		TOSHIBAxxxxxxx
	Port Number		104
	Host Name		TOSHIBAxxxxxxx
	Alias		TOSHIBAxxxxxxx
	Packet Size [byte]		32K
	IP Address		
	Institution Name		SITE1
Remote	**Storage**	AE Title	ARCHIVE1
		Port Number	104
		Host Name	ARCHIVE1
		Alias	ARCHIVE1
		Packet Size [byte]	32K
		IP Address	
		Association per study	OFF
		Association per study for sending multiple studies from patient list	OFF
		Auto archive	OFF
	Commitment	Enable	OFF
		AE Title	ARCHIVE1
	Q/R	Enable	OFF
		AE Title	ARCHIVE1
	Print	Auto send to printer	OFF
		AE Title	PRINTER1,PRINTER2
		Port Number	104
		Host Name	PRINTER1,PRINTER2
		Alias	PRINTER1,PRINTER2
		Packet Size [byte]	32K
		IP Address	
		Enable	OFF
		Color	OFF
		Medium Type	PAPER
		Film Size	8INX10IN

		Film Orientation	LANDSCAPE
		Magnification Type	NONE
		Image Display Format	STANDARD\6,4
		Density Enable	OFF
		Min density	0
		Max density	300
		Negotiate Color or Mono only	OFF
		Association Time Out [sec]	30
	MPPS	AE Title	MPPS
		Port Number	104
		Host Name	MPPS
		Alias	MPPS
		Packet Size [byte]	32K
		IP Address	
		Enable	OFF
	MWM	AE Title	WORKLIST
		Port Number	104
		Host Name	WORKLIST
		Alias	WORKLIST
		Packet Size [byte]	32K
		IP Address	
		Enable	OFF
		Scheduled Station AE	TOSHIBAxxxxxxx
	MEDIA	Ebnable	ON
		Auto Send	OFF

7 Support of Extended Character Sets

This Product supports the following character sets:

- ISO-IR 100 (Latin alphabet No. 1) Supplementary set of ISO 8859

8 DIMSE and Attributes - Verification SCU/SCP

8.1 DIMSE

Table 22

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

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

9 DIMSE and Attributes - Ultrasound Image Storage SCU/SCP

9.1 DIMSE

Table 23

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

*1: M = Mandatory

9.2 Entity Module Definitions

The information modules for the Ultrasound Workstation are defined below.

Table 24

Information Entity	Module	Reference	Usage*[1]
Patient	Patient Module	9.3.1	M
Study	General Study Module	9.3.2	M
Study	Patient Study Module	9.3.3	U
Series	General Series Module	9.3.4	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	9.3.5	M
Image*[2]	General Image Module	9.3.6	M
Image	Image Pixel Module	9.3.7	M
Image	Palette Color Lookup Table	Not Used	C
Image	Contrast/bolus Module	Not Used	C
Image	US Region Calibration Module	9.3.8	U
Image	US Image Module	9.3.9	M
Image	Overlay Plane Module	Not Used	U
Image	VOI LUT Module	Not Used	U
Image	SOP Common Module	9.3.10	M
Curve*[2]	Curve Identification Module	Not Used	M

Curve	Curve Module	Not Used	M
Curve	Audio Module	Not Used	U
Curve	SOP Common	Not Used	M

*1 M = Mandatory, C = Conditional, U = User option
*2 The Image and Curve IEs are mutually exclusive.

9.3 Attributes

9.3.1 Patient Module

Table 25

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010, 0010)	2	Always set
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
Ethnic Group	(0010, 2160)	3	Not set when no entry is made
Patient Comments	(0010, 4000)	3	Not set when no entry is made

9.3.2 General Study Module

Table 26

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020, 000D)	1	Always set
Study ID	(0020, 0010)	2	Always set
Study Date	(0008, 0020)	2	Always set
Study Time	(0008, 0030)	2	Always set
Referring Physician's Name	(0008, 0090)	2	Always set
Accession Number	(0008, 0050)	2	Length = 0 when no entry is made
Study description	(0008, 1030)	3	Not set when no entry is made
Name of Physician(s) Reading Study	(0008, 1060)	3	Not set when no entry is made

9.3.3 Patient Study Module

Table 27

Attribute Name	Tag	Type	Attribute Description
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

9.3.4 General Series Module

Table 28

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	Always set
Series Time	(0008, 0031)	3	Always set
Operator's Name	(0008, 1070)	3	Not set when no entry is made
Protocol Name	(0018, 1030)	3	Not set when no entry is made

9.3.5 General Equipment Module

Table 29

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008, 0070)	2	Always set
Institution Name	(0008, 0080)	3	Always set
Station Name	(0008, 1010)	3	Always set
Institutional Department Name	(0008, 1040)	3	Always set
Manufacturer's Model Name	(0008, 1090)	3	Always set
Device Serial Number	(0018, 1000)	3	Always set
Software Version	(0018, 1020)	3	Always set

9.3.6 General Image Module

Table 30

Attribute Name	Tag	Type	Attribute Description
Image Number	(0020, 0013)	2	Always set
Content Date	(0008, 0023)	2C	Always set
Content Time	(0008, 0033)	2C	Always set
Image Type	(0008, 0008)	3	Always set
Acquisition Date	(0008, 0022)	3	Always set
Acquisition Time	(0008, 0032)	3	Always set
Patient Orientation	(0020, 0020)	2C	Always set (Length = 0)

9.3.7 Image Pixel Module

Table 31

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028, 0002)	1	Always set (3)
Photometric Interpretation	(0028, 0004)	1	Always set ("RGB", “YBR_FULL_422”, or “YBR_FULL”)
Rows	(0028, 0010)	1	Always set (PowerView: 480, DMU: 450)
Columns	(0028, 0011)	1	Always set (PowerView: 640, DMU: 560)
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)
Pixel Data	(7FE0, 0010)	1	Always set
Planar Configuration	(0028, 0006)	1C	Always set (0)
Pixel Aspect Ratio	(0028, 0034)	1C	Always set (1/1)

9.3.8 US Region Calibration Module

9.3.8.1 US Region Calibration Module B-mode

Table 32

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

9.3.8.2 US Region Calibration Module D-mode

Table 33

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
>Reference Pixel x0	(0018, 6020)	3	Always set
>Reference Pixel y0	(0018, 6022)	3	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
>Doppler Sample Volume X Position	(0018, 6038)	3	Always set
>Doppler Sample Volume Y Position	(0018, 603A)	3	Always set

9.3.8.3 US Region Calibration Module M-mode

Table 34

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

9.3.9 US Image Module

Table 35

Attribute Name	Tag	Type	Attribute Description
Sample Per Pixel	(0028, 0002)	1	Always set (3)
Photometric Interpretation	(0028, 0004)	1	Always set ("RGB", "YBR_FULL_422", or “YBR_FULL”)
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)	1C	Always set (0)
Pixel Representation	(0028, 0103)	1	Always set (0)
Image Type	(0008, 0008)	2	Always set
Lossy Image Compression	(0028, 2110)	1C	Always set (0 or 1)
Ultrasound Color Data Present	(0028, 0014)	3	Always set (1)
Transducer Type	(0018, 6031)	3	Not set when entry is not made

9.3.10 SOP Common Module

Table 36

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")

10 DIMSE and Attributes - Ultrasound Multi-frame Image Storage SCU/SCP

10.1 DIMSE

Table 37

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

*1: M = Mandatory

10.2 Entity Module Definitions

The information modules for the Ultrasound Workstation are defined below.

Table 38

Information Entity	Module	Reference	Usage*1
Patient	Patient Module	10.3.1	M
Study	General Study Module	10.3.2	M
Study	Patient Study Module	10.3.3	U
Series	General Series Module	10.3.4	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	10.3.5	M
Image*2	General Image Module	10.3.6	M
Image	Image Pixel Module	10.3.7	M
Image	Palette Color Lookup Table Module	Not Used	C
Image	Contrast/bolus Module	Not Used	C
Image	Cine Module	10.3.8	M
Image	Multi-frame Module	10.3.9	M
Image	US Region Calibration Module	10.3.10	U
Image	US Image Module	10.3.11	M
Image	VOI LUT Module	Not Used	U
Image	SOP Common Module	10.3.12	M
Curve*2	Curve Identification Module	Not Used	M
Curve	Curve Module	Not Used	M
Curve	Audio Module	Not Used	U
Curve	SOP Common	Not Used	M

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

*2 The Image and Curve IEs are mutually exclusive.

10.3 Attributes - Ultrasound Image Storage SCU/SCP

10.3.1 Patient Module

Table 39

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010, 0010)	2	Always set
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
Ethnic Group	(0010, 2160)	3	Not set when no entry is made
Patient Comments	(0010, 4000)	3	Not set when no entry is made

10.3.2 General Study Module

Table 40

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	Always set
Study ID	(0020, 0010)	2	Always set
Accession Number	(0008, 0050)	2	Length = 0 when no entry is made
Study Description	(0008, 1030)	3	Not set when no entry is made
Name of Physician(s) Reading Study	(0008, 1060)	3	Not set when no entry is made

10.3.3 Patient Study Module

Table 41

Attribute Name	Tag	Type	Attribute Description
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

10.3.4 General Series Module

Table 42

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	Always set
Series Time	(0008, 0031)	3	Always set
Operator's Name	(0008, 1070)	3	Not set when no entry is made
Protocol Name	(0018, 1030)	3	Not set when no entry is made

10.3.5 General Equipment Module

Table 43

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008, 0070)	2	Always set
Institution Name	(0008, 0080)	3	Always set
Station Name	(0008, 1010)	3	Always set
Institutional Department Name	(0008, 1040)	3	Always set
Manufacturer's Model Name	(0008, 1090)	3	Always set
Device Serial Number	(0018, 1000)	3	Always set
Software Version	(0018, 1020)	3	Always set

10.3.6 General Image Module

Table 44

Attribute Name	Tag	Type	Attribute Description
Image 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
Acquisition Number	(0020, 0012)	3	Always set
Acquisition Date	(0008, 0022)	3	Always set
Acquisition Time	(0008, 0032)	3	Always set
Lossy Image Compression	(0028, 2110)	3	Always set (0 or 1)

10.3.7 Image Pixel Module

Table 45

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028, 0002)	1	Always set (3)
Photometric Interpretation	(0028, 0004)	1	Always set ("RGB", "YBR_FULL_422", or “YBR_FULL”)
Rows	(0028, 0010)	1	Always set (PowerView: 480, DMU: 450)
Columns	(0028, 0011)	1	Always set (PowerView: 640, DMU: 560)
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)
Pixel Data	(7FE0, 0010)	1	Always set
Planar Configuration	(0028, 0006)	1C	Always set (0)

10.3.8 Cine Module

Table 46

Attribute Name	Tag	Type	Attribute Description
Frame Time	(0018, 1063)	1C	Always set
Start Trim	(0008, 2142)	3	Always set (0)
Stop Trim	(0008, 2143)	3	Always set
Recommended Display Frame Rate	(0008, 2144)	3	Always set
Cine Rate	(0018, 0040)	3	Always set
Frame Delay	(0018, 1066)	3	Always set

Effective Duration	(0018, 0072)	3	Always set
Actual Frame Duration	(0018, 1242)	3	Always set

10.3.9 Multi-frame Module

Table 47

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

10.3.10 US Region Calibration Module

10.3.10.1 US Region Calibration Module B-mode

Table 48

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

10.3.10.2 US Region Calibration Module D-mode

Table 49

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
>Reference Pixel x0	(0018, 6020)	3	Always set
>Reference Pixel y0	(0018, 6022)	3	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
>Doppler Sample Volume X Position	(0018, 6038)	3	Always set
>Doppler Sample Volume Y Position	(0018, 603A)	3	Always set

10.3.10.3 US Region Calibration Module M-mode

Table 50

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

10.3.11 US Image Module

Table 51

Attribute Name	Tag	Type	Attribute Description
Sample Per Pixel	(0028, 0002)	1	Always set (3)
Photometric Interpretation	(0028, 0004)	1	Always set ("RGB", "YBR_FULL_422", or “YBR_FULL”)
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)	1C	Always set (0)
Pixel Representation	(0028, 0103)	1	Always set (0)
Frame Increment Pointer	(0028, 0009)	1C	Always set (0x00181063)
Image Type	(0008, 0008)	2	Always set
Ultrasound Color Data Present	(0028, 0014)	3	Always set (1)
Transducer Type	(0018, 6031)	3	Not set when no entry is made
Lossy Image Compression	(0028, 2110)	1C	Always set (0 or 1)

10.3.12 SOP Common Module

Table 52

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")

11 DIMSE and Attributes - Query/Retrieve SCU

11.1 DIMSE

Table 53

SOP Class	DIMSE Service Element	Usage SCU	Usage
Patient/Study Only Query/Retrieve information Model - FIND SOP Class	C-FIND	M	Used
	C-FIND CANCEL	M	Used
Patient/Study Only Query/Retrieve information Model - MOVE SOP Class	C-MOVE	M	Used
	C-MOVE CANCEL	M	Used

11.2 Patient/Study Only Q/R Information Model - Find

11.2.1 Patient Level SCU Request

Table 54

Attribute Name	Tag	User Input	Type	Matching
Patient's Name	(0010, 0010)	Can be used as a filter	R	Wildcard
Patient ID	(0010, 0020)	Can be used as a filter	U	Wildcard

11.2.2 Study Level SCU Request

Table 55

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

12 DIMSE and Attributes – Print SCU

12.1 DIMSE

Table 56

SOP Class	DIMSE Service Element	Reference	Usage SCU*[1]
Basic Film Session SOP Class	N-CREATE	12.2.1.1	M
	N-DELETE	Used	U
Basic Film Box SOP Class	N-CREATE	12.2.2.1	M
	N-ACTION	Used	M
	N-DELETE	Used	U
Basic Grayscale Image Box SOP Class	N-SET	12.2.3.1	M
Basic Color Image Box SOP Class	N-SET	12.2.4.1	M
Printer SOP Class	N-EVENT-REPORT	12.2.5.1	M
	N-GET		U
Print Job SOP Class	N-EVENT-REPORT	Used	M

*1 M = Mandatory, U = User option

12.2 Attributes

12.2.1 Attributes - Basic Film Session SOP Class

12.2.1.1 Attributes - N-CREATE

Table 57

Attribute Name	Tag	Usage	Attribute Description
Number of Copies	(2000, 0010)	U	Always set
Print Priority	(2000, 0020)	U	Always set
Medium Type	(2000, 0030)	U	Always set
Film Destination	(2000, 0040)	U	Not set when no data is available
Film Session Label	(2000, 0050)	U	Always set ("Not")
Memory Allocation	(2000, 0060)	U	Not set when no data is available

12.2.2 Attributes - Basic Film Box SOP Class

12.2.2.1 Attributes - N-CREATE

Table 58

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

12.2.3 Attributes - Basic Grayscale Image Box SOP Class

12.2.3.1 Attributes – N-SET

Table 59

Attribute Name	Tag	Usage	Attribute Description
Image Position	(2020, 0010)	M	Always set
Polarity	(2020, 0020)	U	Always set
Magnification Type	(2010, 0060)	U	Always set
Smoothing Type	(2010, 0080)	U	Always set
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
>Rows	(0028, 0010)	M	Always set
>Columns	(0028, 0011)	M	Always set
>Pixel Aspect Ratio	(0028, 0034)	M	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

12.2.4 Attributes - Basic color Image Box SOP Class

12.2.4.1 Attributes - N-SET

Table 60

Attribute Name	Tag	Usage	Attribute Description
Image Position	(2020, 0010)	M	Always set
Polarity	(2020, 0020)	U	Always set
Magnification Type	(2010, 0060)	U	Always set
Smoothing Type	(2010, 0080)	U	Always set
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
>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)	M	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

12.2.5 Attributes - Printer SOP Class

Table 61

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

12.2.5.1 Attributes - N-GET/N-EVENT-REPORT

Table 62

Attribute Name	Tag	Usage SCU/SCP
Printer Status	(2110, 0010)	U/M
Printer Status Info	(2110, 0020)	U/M
Printer Name	(2110, 0030)	U/U
Manufacturer	(0008, 0070)	U/U
Manufacturer's Model Name	(0008, 1090)	U/U
Device Serial Number	(0018, 1000)	U/U
Software Version	(0018, 1020)	U/U

12.2.6 Attributes - Print Job SOP Class

Table 63

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

13 DIMSE Service and Attributes - Storage Commitment SCU

13.1 DIMSE

Table 64

SOP Class	DIMSE Service Element	Reference	Usage SCU
STORAGE COMMITMENT PUSH MODEL SOP Class	N-ACTION	13.2	M
	N-EVENT-REPORT	13.3	M

13.2 Attributes - N-ACTION

Table 65

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
		Referenced Study Component Sequence	(0008, 1111)	1C
		> Referenced SOP Class UID	(0008, 1150)	1
		> Referenced SOP Instance UID	(0008, 1155)	1

13.3 Attributes - N-EVENT-REPORT

Table 66

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

14 DIMSE and Attributes – MWM SCU

14.1 DIMSE

Table 67

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

*1 M = Mandatory

The following table shows a list of suggested parameters to be included in the Worklist query in the [WORKLIST] section of the configuration file. This list is easily modified to fit the PACS environment.

14.2 DIMSE Attributes

14.2.1 Matching Key Attributes

14.2.1.1 Scheduled Procedure Step Module

Table 68

Description/Module	Tag	Matching Key Type	Remarks/Matching Type
Scheduled Procedure Step Sequence	(0040, 0100)	R	
>Scheduled Station AE title	(0040, 0001)	R	Single value matching only.
>Scheduled Procedure Step Start Date	(0040, 0002)	R	Range matching only
>Modality	(0008, 0060)	R	Single value matching only.

14.2.2 Return Key Attributes

The supported Return Key Attributes are listed as follows.

14.2.2.1 SOP Common Module

Table 69

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

14.2.2.2 Scheduled Procedure Step Module

Table 70

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	

14.2.2.3 Requested Procedure Module

Table 71

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	

14.2.2.4 Imaging Service Request Module

Table 72

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	

14.2.2.5 Visit Identification Module

Table 73

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

14.2.2.6 Visit Status Module

Table 74

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

14.2.2.7 Visit Relationship Module

Table 75

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	

14.2.2.8 Patient Identification Module

Table 76

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

14.2.2.9 Patient Demographic Module

Table 77

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	

14.2.2.10 Patient Medical Module

Table 78

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	

15 DIMSE and Attributes – MPPS SCU

15.1 DIMSE

Table 79

SOP Class	DIMSE Service Element	Reference	Usage SCU[*1]	Usage
Modality Performed Procedure Step SOP Class	N-CREATE	15.2.1	M	Used
	N-SET	15.2.2	M	Used

[*1] M = Mandatory

15.2 Modality Performed Procedure Step SOP Class

15.2.1 N-CREATE Attributes

15.2.1.1 SOP Common Module

Table 80

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

15.2.1.2 Relationship Module

Table 81

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	

15.2.1.3 Information Module

Table 82

Description/Module	Tag	Req. Type	Remarks
Performed Station AE	(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	

15.2.1.4 Image Acquisition Results Module

Table 83

Description/Module	Tag	Req. 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	

15.2.2 N-SET Attribute

15.2.2.1 Information Module

Table 84

Description/Module	Tag	Req. 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	

15.2.2.2 Image Acquisition Results Module

Table 85

Description/Module	Tag	Req. 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	

16 DIMSE Service and Attributes - Storage (Acceptance)

16.1 DIMSE Services

Table 86

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

*1 M = Mandatory

16.1.1 C-STORE Attribute

Attributes are described in chapter 9 , 10 .

17 DIMSE and Attributes - MOD Medium

17.1 MOD Archive Specification

The MOD archive provides standard conformance to DICOM Interchange Option of the Media Storage Service Class. The Application Profiles and roles are listed as follows:

Table 87

Supported Application Profiles	Real World Activity	Roles
AUG-US-ID-MF-MOD640	Transfer of US Examination	FSC
	Modification of US Examination	FSU
	Review of US Examination	FSR

17.1.1 Real World Activities for this Application Entity

17.1.1.1 Real World Activity

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

17.1.1.1.1 Information Object Definition and DICOMDIR Keys

Information Object Definition and DICOMDIR keys are described in section 17.5 .

17.2 Media Storage Directory IOD Modules

Table 88

Object	Module/Key	Reference	Usage
DICOM File Meta Information		17.4.1	M
Basic Directory Information Object	File-set Identification Module	17.5.1	M
	Directory Information Module	17.5.2	U
Definition of Specific Directory Records	PATIENT keys	17.5.3.1	M
	STUDY keys	17.5.3.2	M
	SERIES keys	17.5.3.3	M
	IMAGE keys	17.5.3.4	M

17.3 Media Storage Image IOD Modules

Table 89

Object	Module	Reference	Usage
DICOM File Meta Information		17.4.2	M
Information Object Definition	The MOD stores a received image in its entirety, without change, in its internal data store. Thus, the IOD modules are dependent on the originating acquisition station and cannot be defined here.	N/A	M

17.4 DICOM File Meta Information

17.4.1 DICOM File Meta Information of Directory IOD

Table 90

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 (0x0001)
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

17.4.2 DICOM File Meta Information Image IOD

Table 91

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 (0x0001)
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

17.5 Basic Directory Information Object Definitions

17.5.1 File-set Identification Module

Table 92

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

17.5.2 Directory Information Module

Table 93

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	Always set
>Offset of the Next Directory Record	(0004, 1400)	1C	Always set
>Record In-use Flag	(0004, 1410)	1C	Always set
>Offset of Referenced Lower-Level Directory Entity	(0004, 1420)	1C	Always set
>Directory Record Type	(0004, 1430)	1C	Always set
>Referenced File ID	(0004, 1500)	1C	Set if present in image object
>Referenced SOP Class UID in File	(0004, 1510)	1C	Set if present in image object
>Referenced SOP Instance UID in File	(0004, 1511)	1C	Set if present in image object
>Referenced Transfer Syntax UID in File	(0004, 1512)	1C	Set if present in image object

17.5.3 Definition of Specific Directory Records

17.5.3.1 PATIENT Keys

Table 94

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
Any other Attribute of the Patient IOD or Patient IE present in the original image received		3	

17.5.3.2 STUDY keys

Table 95

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
Study Instance UID	(0020, 000D)	1C	Always set
Study ID	(0020, 0010)	1	Always set
Accession Number	(0008, 0050)	2	Set if present in image object
Study Description	(0008, 1030)	2	Set if present in image object
Any other Attribute of the Study IOD or Study IE present in the original image received		3	

17.5.3.3 SERIES keys

Table 96

Attribute Name	Tag	Type	Attribute Description
Specific Character set	(0008, 0005)	1C	Always set (“ISO_IR 100”)
Modality	(0008, 0060)	1	Always set
Series Instance UID	(0020, 000E)	1	Always set
Series Number	(0020, 0011)	1	Always set
Any other Attribute of the Series IE modules present in the original image received		3	

17.5.3.4 IMAGE keys

Table 97

Attribute Name	Tag	Type	Attribute Description
Specific Character set	(0008, 0005)	1C	Always set (“ISO_IR 100”)
Referenced Image Sequence	(0008, 1140)	3	Set if present in image object
>Referenced SOP Class UID	(0008, 1150)	3	Set if present in image object
>Referenced SOP Instance UID	(0008, 1155)	3	Set if present in image object
Image Position Patient (Patient)	(0020, 0032)	3	Set if present in image object
Frame of Reference UID	(0020, 0052)	3	Set if present in image object
Rows	(0028, 0010)	3	Set if present in image object
Columns	(0028, 0011)	3	Always set
Pixel Spacing	(0028, 0030)	3	Always set
Image Type	(0008, 0008)	3	Set if present in image object
Image Number	(0020, 0013)	1	Always set
Any other Attribute of the Image IE modules present in the original image received		3	