DICOM Conformance Statement (E-CUBE 5)

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FIGURE

TABLE

1. INTRODUCTION

1.1 REVISION HISTORY

Rev No.	CR No.	Reason / Change Summary	Date
0	N/A	Initial release	2012.3.6

1.2 AUDIENCE

This document is written for the people that need to understand how E-CUBE 5 VER1.0 will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

1.3 REFERENCE

The information object implementation refers to DICOM PS 3.3 (Information Object Definition).

1.4 TERMS AND DEFINITION

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – the externally known name of an *Application Entity*, used to

identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association – a network communication channel set up between *Application Entities*.

Attribute – a unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements.

Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD) – the specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

Module – a set of *Attributes* within an *Information Object Definition* that are logically related to each other.

Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context – the set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile – a set of mechanisms, such as encryption, user authentication, or

digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

Service Class Provider (SCP) – role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity* (*Service Class User*). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element.
Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data],
(0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little Endean explicit value representation.

Unique Identifier (UID) – a globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier.
Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of

each data element.

1.5 ABBREVIATIONS

AE	Application Entity
AET	Application Entity Title
CD-R	Compact Disk Recordable
CSE	Customer Service Engineer
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
GSDF	Grayscale Standard Display Function
GSPS	Grayscale Softcopy Presentation State
HIS	Hospital Information System
HL7	Health Level 7 Standard
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
ISO	International Organization for Standards
IO	Intra-oral X-ray
JPEG	Joint Photographic Experts Group
LUT	Look-up Table
MPEG	Moving Picture Experts Group
MG	Mammography (X-ray)
MSPS	Modality Scheduled Procedure Step
MTU	Maximum Transmission Unit (IP)
MWL	Modality Worklist
NTP	Network Time Protocol
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
RDN	Relative Distinguished Name (LDAP)

RIS	Radiology Information System
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SPS	Scheduled Procedure Step
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol
US	Ultrasound
VR	Value Representation

2. NETWORKING

2.1 IMPLEMENTATION MODEL

2.1.1 Application Data Flow

There are six local real world activities in E-CUBE 5 as below figure

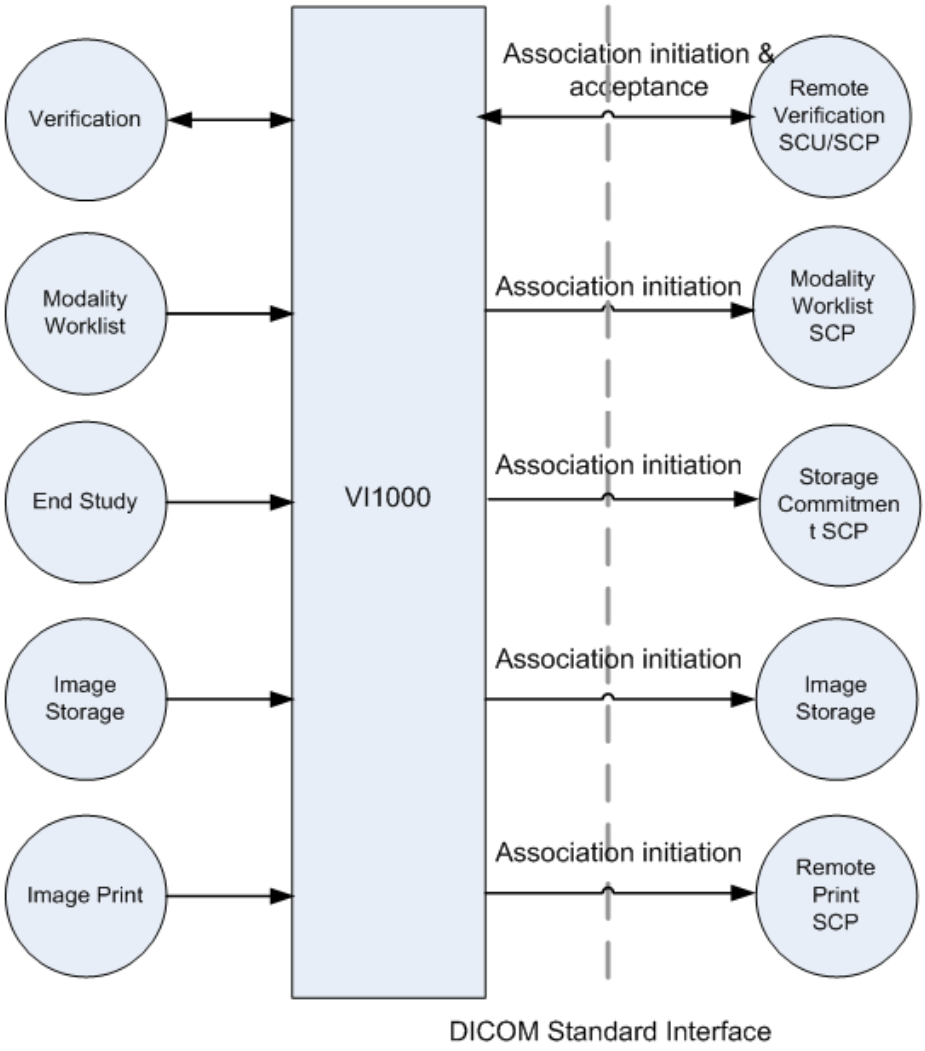

Figure 1: Real World Activities Model

Verification initiates a connection with the DICOM SCP and request verification and close connection

Modality Worklist initiates a connection with DICOM SCP and performs query with search criteria and retrieves to the product

End Study (End Exam) initiates a connection with the DICOM SCP and transmits images and reports to the DICOM SCP. If Storage Commitment is configured, a commitment request will be sent for the images and reports.
Image Storage will send images to DICOM Storage SCP
Image Print will send images to DICOM Print SCP
OB Measurement Storage will send OB Measurement to Structured Report Storage SCP

2.1.2 Functional Definition of AE's

Initiates a DICOM verification to support network diagnostics.
Initiates a DICOM association to send images and reports.
Transmits DICOM images and reports to the DICOM Storage SCP.
Initiates a DICOM worklist query to receive worklist information.
Initiates a DICOM association to request storage commitment of images.
Responds to replies for storage commitment of images
Initiates a DICOM association to print images

2.2 AE SPECIFICATION

2.1.1 Storage Application Entity Specification

2.2.1.1 SOP Classes

This Application Entity provides Standard Conformance to the following DICOM SOP Classes as an **SCU**:

Table 1: DICOM SOP CLASSES (SCU)

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

Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1
Basic Grayscle Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18

2.2.1.2 Association Policy

2.2.1.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

Table 2: DICOM APPLICATION CONTEXT FOR AE STORAGE

Application Context Name	1.2.840.10008.3.1.1.1

2.2.1.2.2 Number of association

E-CUBE 5 VER1.0 will initiate single DICOM associations.

2.2.1.2.3 Asynchronous Nature

E-CUBE 5 VER1.0 does not support asynchronous communication.

2.2.1.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 3: DICOM IMPLEMENTATION CLASS AND VERSION FOR AE STORAGE

E-CUBE 5 VER1.0 Implementation Class UID	1.2.410.1.114480. *ModelNumber.VersionNumber*
E-CUBE 5 VER1.0 Implementation Version Name	E-CUBE 5_01

2.2.1.3 Association Initiation Policy

2.2.1.3.1 Real World Activity – Send Images

2.2.1.3.1.1 Description and Sequencing of Activities

A user can select images and request them to be sent to multiple destinations (up to n). Each request is forwarded to the job queue and

processed individually. When the "Auto-send" option is active, each marked instance or marked set of instances stored in database will be forwarded to the network job queue for a pre-configured auto-send target destination. It can be configured which instances will be automatically marked and the destination where the instances are automatically sent to. The "Auto - Send" is triggered by the "End Study" user application

The Storage AE attempts to initiate a new Association in order to issue a C-STORE request. If the job contains multiple images then multiple C-STORE requests will be issued over the same Association.
If the Remote AE is configured as an archive device the Storage AE will, after all images and presentation states have been sent, transmit a single Storage Commitment request (N-ACTION) over a new Association. Upon receiving the N-ACTION response the Storage AE will delay releasing the Association for a configurable amount of time. If no N-EVENT-REPORT is received within this time period the Association will be immediately released (i.e. notification of Storage Commitment success or failure will be received over a separate association). However, the Storage AE is capable of receiving an N-EVENT-REPORT request at any time during an association provided a Presentation Context for the Storage Commitment Push Model has been successfully negotiated (i.e. the N-ACTION is sent at the end of one association and the N-EVENT-REPORT is received during an association initiated for a subsequent send job or during an association initiated by the Remote AE for the specific purpose of sending the N-EVENT-REPORT).

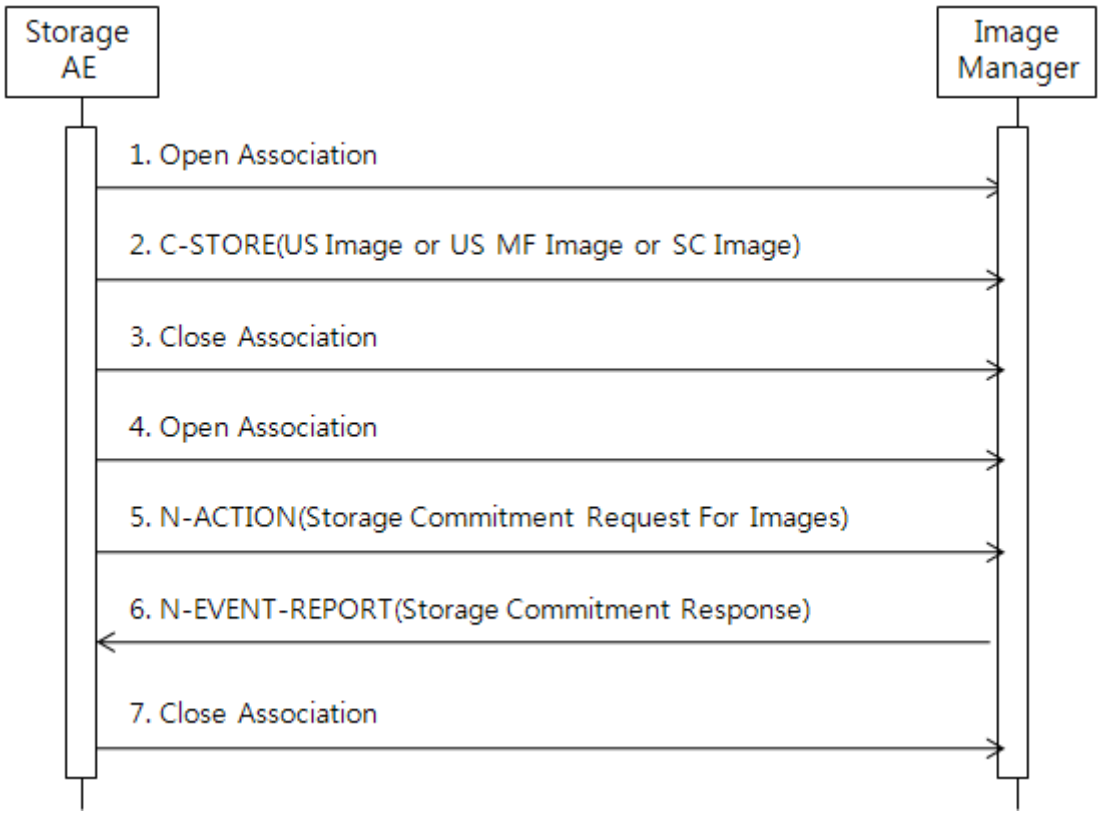

Figure 2: REAL WORLD ACTIVITY –SEND IMAGE

2.2.1.3.1.2 Associated Real World Activity

On a request by the operator (manual or automatic), image will be sent to a DICOM Storage SCP.

2.2.1.3.1.3 Proposed Presentation Contexts

E-CUBE 5 VER1.0 is capable of proposing the Presentation Contexts shown in the following table:

A Presentation Context for the Storage Commitment Push Model will only be proposed if the Remote AE is configured as an archive device.

Table 4- PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY SEND IMAGES

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Ultrasound Image	1.2.840.10008.5.1.4.1.	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

Storage	1.6.1	RLE Lossless	1.2.840.10008.1.2.5		
		JPEG Baseline(Process1) - Lossy	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Non-Hierarchical(Process 14)	1.2.840.10008.1.2.4.57		
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		RLE Lossless	1.2.840.10008.1.2.5		
		JPEG Baseline(Process1) - Lossy	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Non-Hierarchical(Process 14)	1.2.840.10008.1.2.4.57		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		RLE Lossless	1.2.840.10008.1.2.5		
		JPEG Baseline(Process1) - Lossy	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Non-Hierarchical(Process 14)	1.2.840.10008.1.2.4.57		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

2.2.1.3.1.4 SOP Specific Conformance Image State Storage SOP Classes

The Storage SOP Classes supported by the Storage AE exhibit the same behavior, except where stated, and are described together in this section. The behavior of Storage AE when encountering status codes in a C-STORE response is summarized in the Table below:

Table 5: STORAGE C-STORE RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has successfully stored the SOP Instance. If all SOP Instances in a send job have status success then the job is marked as complete.
Refused	Out of Resources	A700-A7FF	The Association is aborted using A-ABORT and the send job is marked as failed. The status meaning is logged and the job failure is reported to the user via the job control application. This is a transient failure.
Error	Data Set does not match SOP Class	A900-A9FF	The Association is aborted using A-ABORT and the send job is marked as failed. The status meaning is logged and the job failure is reported to the user via the job control application.
Error	Cannot Understand	C000-CFFF	The Association is aborted using A-ABORT and the send job is marked as failed. The status meaning is logged and the job failure is reported to the user via the job control application.
Warning	Coercion of Data Elements	B000	Image transmission is considered successful but the status meaning is logged.
Warning	Data Set does not match SOP Class	B007	Image transmission is considered successful but the status meaning is logged.
Warning	Elements Discarded	B006	Image transmission is considered successful but the status meaning is logged.
*	*	Any other status code.	The Association is aborted using A-ABORT and the send job is marked as failed. The status code is logged and the job failure is reported to the user via the job control application.

The behavior of Storage AE during communication failure is summarized in the Table below:

Table 6: STORAGE COMMUNICATION FAILURE BEHAVIOR

Exception	Behavior
Timeout	The Association is aborted using A-ABORT and the send job is marked as failed. The reason is logged and the job failure is reported to the user via the job control application.
Association aborted by the SCP or network layers	The send job is marked as failed. The reason is logged and the job failure is

	reported to the user via the job control application.

A failed send job can be restarted by user interaction not automatically. The delay between resending failed jobs and the number of retries is also configurable.

2.2.1.3.1.5 SOP Specific Conformance for Storage Commitment SOP Class

2.2.1.3.1.5.1 Storage Commitment Operations (N-ACTION)

The Storage AE will request storage commitment for Image Storage SOP Class if the Remote AE is configured as an archive device and a presentation context for the Storage Commitment Push Model has been accepted. The Storage AE will consider Storage Commitment failed if no N-EVENT-REPORT is received for a Transaction UID within a configurable time period after receiving a successful N-ACTION response (duration of applicability for a Transaction UID).The Storage AE does not send the optional Storage Media FileSet ID & UID Attributes or the Referenced Study Component Sequence Attribute in the N-ACTION. The behavior of Storage AE when encountering status codes in a N-ACTION response is summarized in the Table below:

Table 7: STORAGE COMMITMENT N-ACTION RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The request for storage comment is considered successfully sent. A timer is started which will expire if no N-EVENT-REPORT for the Transaction UID is received within a configurable timeout period.
*	*	Any other status code.	The Association is aborted using A-ABORT and the request for storage comment is marked as failed. The status meaning is logged and reported to the user.

The behavior of Storage AE during communication failure is

summarized in the Table below:

Table 8: STORAGE COMMITMENT COMMUNICATION FAILURE BEHAVIOR

Exception	Behavior
Timeout	The Association is aborted using A-ABORT and the send job is marked as failed. The reason is logged and the job failure is reported to the user via the job control application.
Association aborted by the SCP or network layers	The send job is marked as failed. The reason is logged and the job failure is reported to the user via the job control application.

2.2.1.3.1.5.2 Storage Commitment Notifications (N-EVENT-REPORT)

The Storage AE is capable of receiving an N-EVENT-REPORT notification if it has successfully negotiated a Presentation Context for the Storage Commitment Push Model (i.e. only associations established with archive devices).Upon receipt of a N-EVENT-REPORT the timer associated with the Transaction UID will be canceled. The behavior of Storage AE when receiving Event Types within the N-EVENT-REPORT is summarized in the Table below.

Table 9: STORAGE COMMITMENT N-EVENT-REPORT BEHAVIOUR

Event Type Name	Event Type ID	Behavior
Storage Commitment Request Successful	1	The Referenced SOP Instances under Referenced SOP Sequence (0008,1199) are marked within the database as “Stored & Committed (SC)” to the value of Retrieve AE Title (0008,0054). Successfully committed SOP Instances are candidates for automatic deletion from the local database if local resources become scarce. The conditions under which automatic deletion is initiated and the amount of space freed are site configurable. SOP Instances will not be deleted if they are marked with a lock flag. The least recently accessed SOP Instances are deleted first.
Storage Commitment Request Complete – Failures Exist	2	The Referenced SOP Instances under Referenced SOP Sequence (0008,1199) are treated in the same way as in the success case (Event Type 1). The Referenced SOP Instances under Failed SOP Sequence (0008,1198) are marked within the database as “Store & Commit Failed (Sf)”.

		The Failure Reasons are logged and the job failure is reported to the user via the job control application. A send job that failed storage commitment will not be automatically restarted but can be restarted by user interaction.

The reasons for returning specific status codes in a N-EVENT-REPORT response are summarized in the Table below.

Table 10: STORAGE COMMITMENT N-EVENT-REPORT RESPONSE STATUS REASONS

Service Status	Further Meaning	Error Code	Reasons
Success	Success	0000	The storage commitment result has been successfully received.
Failure	Unrecognized Operation	0211H	The Transaction UID in the N-EVENT-REPORT request is not recognized (was never issued within an N-ACTION request).
Failure	Resource Limitation	0213H	The Transaction UID in the N-EVENT-REPORT request has expired (no N-EVENT-REPORT was received within a configurable time limit).
Failure	No Such Event Type	0113H	An invalid Event Type ID was supplied in the N-EVENT-REPORT request.
Failure	Processing Failure	0110H	An internal error occurred during processing of the N-EVENT-REPORT. A short description of the error will be returned in Error Comment (0000,0902).
Failure	Invalid Argument Value	0115H	One or more SOP Instance UIDs with the Referenced SOP Sequence (0008,1199) or Failed SOP Sequence (0008,1198) was not included in the Storage Commitment Request associated with this Transaction UID. The unrecognized SOP Instance UIDs will be returned within the Event Information of the N-EVENT-REPORT response.

2.2.1.4 Association Acceptance Policy

2.2.1.4.1 Activity – Receive Storage Commitment Response

2.2.1.4.1.1 Description and Sequencing of Activities

The Storage AE will accept associations in order to receive responses to a Storage Commitment Request.

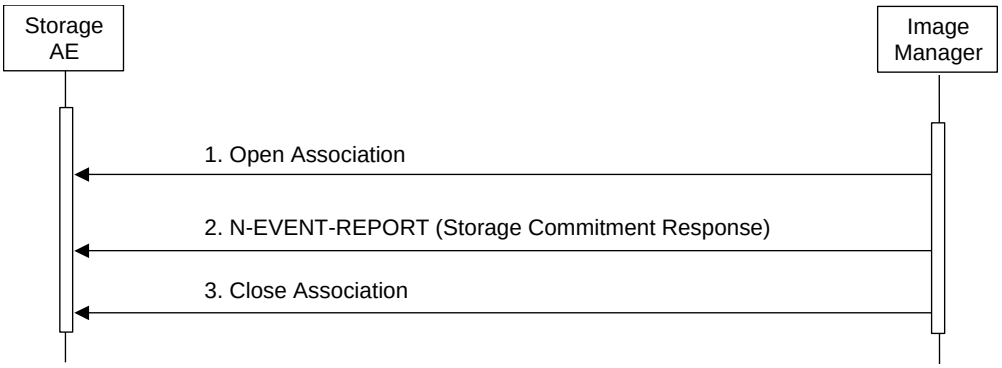

Figure 3: SEQUENCING OF ACTIVITY - RECEIVE STORAGE COMMITMENT RESPONSE

A possible sequence of interactions between the Storage AE and an Image Manager (e.g. a storage or archive device supporting Storage Commitment SOP Classes as an SCP) is illustrated in the Figure above:

1. The Image Manager opens a new association with the Storage AE.
2. The Image Manager sends an N-EVENT-REPORT request notifying the Storage AE of the status of a previous Storage Commitment Request. The Storage AE replies with a N-EVENT-REPORT response confirming receipt.
3. The Image Manager closes the association with the Storage AE.

The Storage AE may reject association attempts as shown in the Table below. The Result, Source and Reason/Diag columns represent the values returned in the appropriate fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4). The contents of the Source column is abbreviated to save space and the meaning of the abbreviations are:

A. 1 – DICOM UL service-user
B. 2 – DICOM UL service-provider (ASCE related function)
C. 3 – DICOM UL service-provider (Presentation related function)

Table 11: ASSOCIATION REJECTION REASONS

Result	Source	Reason/Diag	Explanation
2 – rejected-	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous associations has been reached.

transient			An association request with the same parameters may succeed at a later time.
2 – rejected-transient	c	1 – temporary-congestion	No associations can be accepted at this time due to the real-time requirements of higher priority activities (e.g. during image acquisition no associations will be accepted) or because insufficient resources are available (e.g. memory, processes, threads). An association request with the same parameters may succeed at a later time.
1 – rejected-permanent	a	2 – application-context-name-not-supported	The association request contained an unsupported Application Context Name. An association request with the same parameters will not succeed at a later time.
1 – rejected-permanent	a	7 – called-AE-title-not-recognized	The association request contained an unrecognized Called AE Title. An association request with the same parameters will not succeed at a later time unless configuration changes are made. This rejection reason normally occurs when the association initiator is incorrectly configured and attempts to address the association acceptor using the wrong AE Title.
1 – rejected-permanent	a	3 – calling-AE-title-not-recognized	The association request contained an unrecognized Calling AE Title. An association request with the same parameters will not succeed at a later time unless configuration changes are made. This rejection reason normally occurs when the association acceptor has not been configured to recognize the AE Title of the association initiator.
1 – rejected-permanent	b	1 – no-reason-given	The association request could not be parsed. An association request with the same format will not succeed at a later time.

2.2.1.4.1.2 Accepted Presentation Contexts

The Storage AE will accept Presentation Contexts as shown in the Table below.

Table 12: ACCEPTABLE PRESENTATION CONTEXTS FOR ACTIVITY RECEIVE STORAGE COMMITMENT RESPONSE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

2.2.2. Workflow Application Entity Specification

2.2.2.1 SOP Classes

E-CUBE 5 Ver 1.x provides Standard Conformance to the following SOP Classes:

Table 13: SOP CLASSES FOR AE WORKFLOW

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No

2.2.2.2 Association Policies

2.2.2.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

Table 14: DICOM APPLICATION CONTEXT FOR AE WORKFLOW

Application Context Name	1.2.840.10008.3.1.1.1

2.2.2.2.2 Number of Associations

E-CUBE 5 Ver 1.x initiates one Association at a time for a Worklist request.

Table 15: NUMBER OF ASSOCIATIONS INITIATED FOR AE WORKFLOW

Maximum number of simultaneous Associations	1

2.2.2.2.3 Asynchronous Nature

E-CUBE 5 Ver 1.x does not support asynchronous communication.

2.2.2.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 16: DICOM IMPLEMENTATION CLASS AND VERSION FOR AE WORKFLOW

Implementation Class UID	1.2.840.114480.3.5.4
Implementation Version Name	E-CUBE 5_01

2.2.2.3 Association Initiation Policy

2.2.2.3.1 Activity – Worklist Query

2.2.2.3.1.1 Description and Sequencing of Activities

The request for a Worklist Query is initiated by user interaction, i.e. pressing the buttons "Worklist Query" automatically at specific time intervals, configurable by the user. With "Worklist Query" the automated query mechanism is performed immediately on request, while with "Patient Worklist Query" a dialog to enter search criteria is opened and an interactive query can be performed.

The interactive Patient Worklist Query will display a dialog for entering data as search criteria. When the Query is started on user request, only the data from the dialog will be inserted as matching keys into the query.

With automated worklist queries (including "Worklist Update") the E-CUBE 5 always requests all items for a Scheduled Procedure Step Start Date (actual date), Modality (US) and Scheduled Station AE Title. Query for the Scheduled Station AE Title is configurable by a Service Engineer.

Upon initiation of the request, the E-CUBE 5 will build an Identifier for the C-FIND request, will initiate an Association to send the request and will wait for Worklist responses. After retrieval of all responses, E-CUBE 5 will access the local database to add or update patient demographic data. To protect the system from overflow, the E-CUBE 5 will limit the

number of processed worklist responses to a configurable maximum. During receiving the worklist response items are counted and the query processing is canceled by issuing a C-FIND-CANCEL if the configurable limit of items is reached. The results will be displayed in a separate list, which will be cleared with the next worklist update.

E-CUBE 5 will initiate an Association in order to issue a C-FIND request according to the Modality Worklist Information Model.

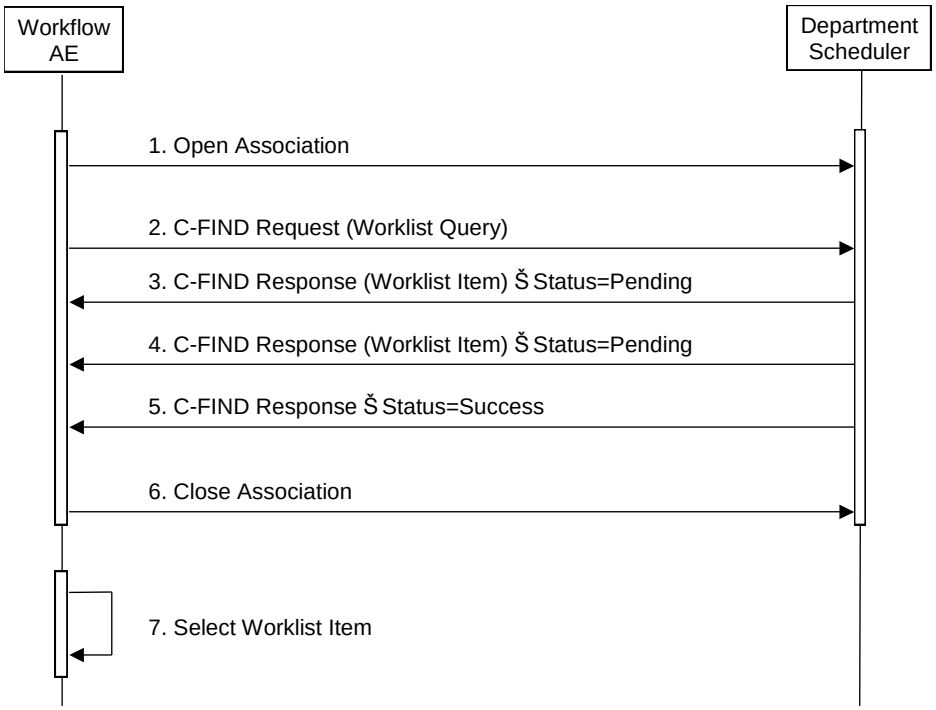

Figure 4: SEQUENCING OF ACTIVITY – WORKLIST UPDATE

A possible sequence of interactions between the Workflow AE and a Departmental Scheduler (e.g. a device such as a RIS or HIS which supports the Modality Worklist SOP Class as an SCP) is illustrated in the Figure above:

1. The Worklist AE opens an association with the Departmental Scheduler
2. The Worklist AE sends a C-FIND request to the Departmental

Scheduler containing the Worklist Query attributes.

3. The Departmental Scheduler returns a C-FIND response containing the requested attributes of the first matching Worklist Item.
4. The Departmental Scheduler returns another C-FIND response containing the requested attributes of the second matching Worklist Item.
5. The Departmental Scheduler returns another C-FIND response with status Success indicating that no further matching Worklist Items exist. This example assumes that only 2 Worklist items match the Worklist Query.
6. The Worklist AE closes the association with the Departmental Scheduler.
7. The user selects a Worklist Item from the Worklist and prepares to acquire new images.

2.2.2.3.1.2 Proposed Presentation Contexts

E-CUBE 5 will propose Presentation Contexts as shown in the following table:

Table 17: PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY WORKLIST UPDATE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

2.2.2.3.1.3 SOP Specific Conformance for Modality Worklist

The behavior of E-CUBE 5 when encountering status codes in a Modality Worklist C-FIND response is summarized in the Table below. If any other SCP response status than "Success" or "Pending" is received by E-CUBE 5, a message “failed” will appear on the user interface.

Table 18: MODALITY WORKLIST C-FIND RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	The SCP has completed the matches. Worklist items are available for display or further processing.
Refused	Out of Resources	A700	The Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query. Any additional error information in the Response will be logged.
Failed	Identifier does not match SOP Class	A900	The Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query. Any additional error information in the Response will be logged.
Failed	Unable to Process	C000 – CFFF	The Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query. Any additional error information in the Response will be logged.
Cancel	Matching terminated due to Cancel request	FE00	If the query was cancelled due to too may worklist items then the SCP has completed the matches. Worklist items are available for display or further processing. Otherwise, the Association is aborted using A-ABORT and the worklist query is marked as failed. The status meaning is logged and reported to the user if an interactive query.
Pending	Matches are continuing	FF00	The worklist item contained in the Identifier is collected for later display or further processing.
Pending	Matches are continuing – Warning that one or more Optional Keys were not supported	FF01	The worklist item contained in the Identifier is collected for later display or further processing. The status meaning is logged only once for each C-FIND operation.
*	*	Any other status code.	The Association is aborted using A-ABORT and the worklist is marked as failed. The status meaning is logged and reported to the user if an interactive query. Any additional error information in the Response will be logged.

The behavior E-CUBE 5 during communication failure is summarized in

the Table below.

Table 19: MODALITY WORKLIST COMMUNICATION FAILURE BEHAVIOR

Exception	Behavior
Timeout	The Association is aborted using A-ABORT and the worklist query marked as failed. The reason is logged and reported to the user if an interactive query.
Association aborted by the SCP or network layers	The worklist query is marked as failed. The reason is logged and reported to the user if an interactive query.

Acquired images will always use the Study Instance UID specified for the Scheduled Procedure Step (if available). If an acquisition is unscheduled, a Study Instance UID will be generated locally.

The Table below provides a description of the E-CUBE 5 Worklist Request Identifier and specifies the attributes that are copied into the images. Unexpected attributes returned in a C-FIND response are ignored.

Requested return attributes not supported by the SCP are set to have no value. Non-matching responses returned by the SCP due to unsupported optional matching keys are ignored. No attempt is made it filter out possible duplicate entries.

Table 20: WORKLIST REQUEST IDENTIFIER

Module Name Attribute Name	Tag	VR	M	R	Q	D	IOD
SOP Common Specific Character Set	(0008,0005)	CS		x			

Scheduled Procedure Step							
Scheduled Procedure Step Sequence	(0040,0100)	SQ		x			
> Scheduled Station AET	(0040,0001)	AE	(S)		x	x	
> Scheduled Procedure Step Start Date	(0040,0002)	DA	S		x	x	
> Scheduled Procedure Step Start Time	(0040,0003)	TM		x	x	x	
> Modality	(0008,0060)	CS	S	x	x		
> Scheduled Performing Physician's Name	(0040,0006)	PN		x	x	x	x
> Scheduled Procedure Step Description	(0040,0007)	LO		x	x	x	x
> Scheduled Station Name	(0040,0010)	SH		x	x		
> Scheduled Procedure Step Location	(0040,0011)	SH		x			
> Scheduled Protocol Code Sequence	(0040,0008)	SQ		x			x
> Pre-Medication	(0040,0012)	LO		x		x	
> Scheduled Procedure Step ID	(0040,0009)	SH		x		x	x
> Requested Contrast Agent	(0032,1070)	LO		x		x	
Requested Procedure							
Requested Procedure ID	(0040,1001)	SH		x	x	x	x
Requested Procedure Description	(0032,1060)	LO		x	x	x	x
Study Instance UID	(0020,000D)	UI		x			x
Requested Procedure Priority	(0040,1003)	SH		x			
Patient Transport Arrangements	(0040,1004)	LO		x			
Referenced Study Sequence	(0008,1110)	SQ		x			x
Requested Procedure Code Sequence	(0032,1064)	SQ		x			x
Imaging Service Request							
Accession Number	(0008,0050)	SH		x	x	x	x
Requesting Physician	(0032,1032)	PN		x	x	x	x
Referring Physician's Name	(0008,0090)	PN		x	x	x	x
Visit Identification							
Admission ID	(0038,0010)	LO		x	x		
Visit Status							
Current Patient Location	(0038,0300)	LO		x	x		
Visit Admission							
Admitting Diagnosis Description	(0008,1080)	LO		x		x	
Patient Identification							
Patient Name	(0010,0010)	PN		x	x	x	x
Patient ID	(0010,0020)	LO		x	x	x	x
Patient Demographic							
Patient's Birth Date	(0010,0030)	DA		x	x	x	x
Patient's Sex	(0010,0040)	CS		x	x	x	x
Patient's Weight	(0010,1030)	DS		x	x	x	x
Confidentiality constraint on patient data	(0040,3001)	LO		x		x	

Patient Medical							
Patient State	(0038,0500)	LO		x		x	
Pregnancy Status	(0010,21C0)	US		x	x	x	
Medical Alerts	(0010,2000)	LO		x	x	x	
Allergies	(0010,2110)	LO		x	x	x	
Special Needs	(0038,0050)	LO		x		x	

The above table should be read as follows:

Module Name: The name of the associated module for supported worklist attributes.

Attribute Name: Attributes supported to build an E-CUBE 5 Worklist Request Identifier.

- Tag: DICOM tag for this attribute.
- VR: DICOM VR for this attribute.
- M: Matching keys for (automatic) Worklist Update. A "S" will indicate that E-CUBE 5 will supply an attribute value for Single Value Matching, a "R" will indicate Range Matching and a "*" will denote wildcard matching. It can be configured if "Scheduled Station AE Title" is additionally supplied "(S)" and if Modality is set to US.
- R: Return keys. An "x" will indicate that E-CUBE 5 will supply this attribute as Return Key with zero length for Universal Matching. The E-CUBE 5 will support retired date format (yyyy.mm.dd) for "Patient's Birth Date" and "Scheduled Procedure Step Start Date" in the response identifiers. For "Scheduled Procedure Step Start Time" also retired time format as well as unspecified time components are supported.
- Q: Interactive Query Key. An "x" will indicate that E-CUBE 5 will supply this attribute as matching key, if entered in the Query Patient Worklist dialog. For example, the Patient Name can be entered thereby restricting Worklist responses to Procedure Steps scheduled for the patient.
- D: Displayed keys. An "x" indicates that this worklist attribute is displayed to the user during a patient registration dialog. For

example, Patient Name will be displayed when registering the patient prior to an examination.

- IOD: An "x" indicates that this Worklist attribute is included into all Object Instances created during performance of the related Procedure Step.

The default Query Configuration is set to "Modality" (US) and "Date" (date of today). Optionally, additional matching for the own AET is configurable.

2.2.2.3.2 Activity – Acquire Images

2.2.2.3.2.1 Description and Sequencing of Activities

An Association to the configured MPPS SCP system is established immediately after the first image is acquired to send the MPPS N-Create message with status of "IN PROGRESS".

The "End Exam" button causes a "COMPLETED" status in the N-Set message. An exam for which an MPPS Instance is sent with a state of "COMPLETED" can no longer be updated.
The system supports creation of "unscheduled cases" by allowing MPPS Instances to be communicated for locally registered Patients.

The system performs a single Performed Procedure Step at a time per Scheduled Procedure Step.

E-CUBE5 will initiate an Association to issue an:
— N-CREATE request according to the CREATE Modality Performed Procedure Step SOP Instance operation or a
— N-SET request to finalize the contents and state of the MPPS according to the SET Modality Performed Procedure Step Information operation.

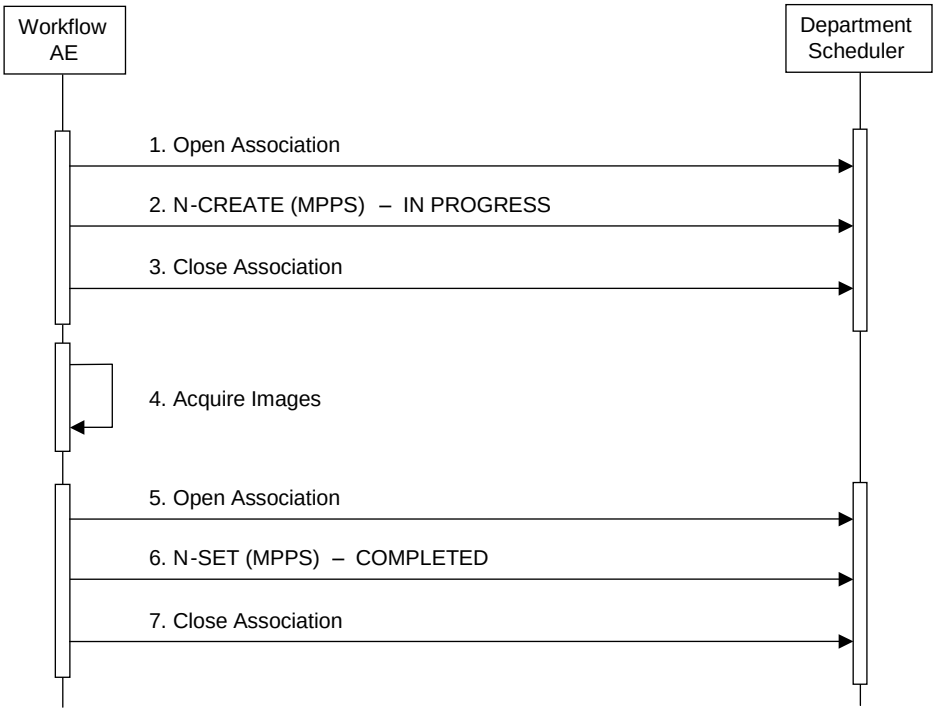

Figure 5: SEQUENCING OF ACTIVITY – ACQUIRE IMAGES

2.2.2.3.2.2 Proposed Presentation Contexts

E-CUBE 5 will propose Presentation Contexts as shown in the following table:

Table 21: PROPOSED PRESENTATION CONTEXTS FOR REAL-WORLD ACTIVITY ACQUIRE IMAGES

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.2.2.3.2.3 SOP Specific Conformance for MPPS

The behavior of E-CUBE 5 when encountering status codes in an MPPS N-CREATE or N–SET response is summarized in Table 22.

Table 22: MPPS N-CREATE / N-SET RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has completed the operation successfully.
Failure	Processing Failure – Performed Procedure Step Object may no longer be updated	0110	The Association is aborted.
Warning	Attribute Value Out of Range	0116H	The error message is logged.
*	*	Any other status code.	Same as “Failure” above.

Table 23 summarizes the behavior of E-CUBE 5 during communication failure.

Table 23: MPPS COMMUNICATION FAILURE BEHAVIOR

Exception	Behavior
Timeout	Same as “Failure” above.
Association aborted by the SCP or network layers	Same as “Failure” above. .

Table 24 provides a description of the MPPS N-CREATE and N-SET request identifiers. Empty cells in the N-CREATE and N-SET columns indicate that the attribute is not sent.

Table 24: MPPS N-CREATE / N-SET REQUEST IDENTIFIER

Attribute Name	Tag	VR	N-CREATE	N-SET
Modality	(0008,0060)	CS	US	
Referenced Patient Sequence	(0008,1120)	SQ	Zero Length	
Patient’s Name	(0010,0010)	PN	From Modality Worklist or user input	
Patient ID	(0010,0020)	LO	Same as above	
Patient’s Birth Date	(0010,0030)	DA	Same as above	
Patient’s Sex	(0010,0040)	CS	Same as above	
Study ID	(0020,0010)	SH		
Performed Station AE Title	(0040,0241)	AE	From System Configuration	
Performed Station	(0040,0242)	SH	From System	

Name			Configuration	
Performed Location	(0040,0243)	SH	From System Configuration	
Performed Procedure Step Start Date	(0040,0244)	DA	Actual start date	
Performed Procedure Step Start Time	(0040,0245)	TM	Actual start time	
Performed Procedure Step End Date	(0040,0250)	DA	Zero length	Actual end date
Performed Procedure Step End Time	(0040,0251)	TM	Zero length	Actual end time
Performed Procedure Step Status	(0040,0252)	CS	IN PROGRESS	DISCONTINUED or COMPLETED
Performed Procedure Step ID	(0040,0253)	SH	Auto generated, or mapped from MWL	
Performed Procedure Step Description	(0040,0254)	LO	From Modality Worklist	
Performed Procedure Type Description	(0040,0255)	LO	If present in MWL, else zero length	
Performed Protocol Code Sequence	(0040,0260)	SQ	Zero length	
Scheduled Step Attributes Sequence	(0040,0270)	SQ		
> Accession Number	(0008,0050)	SH	From Modality Worklist or user input	
> Referenced Study Sequence	(0008,1110)	SQ	From Modality Worklist	
>> Referenced SOP Class UID	(0008,1150)	UI	From Modality Worklist	
>> Referenced SOP Instance UID	(0008,1155)	UI	From Modality Worklist	
> Study Instance UID	(0020,000D)	UI	From Modality Worklist	
> Requested	(0032,1060)	LO	From Modality Worklist	

Procedure Description				
> Scheduled Procedure Step Description	(0040,0007)	LO	From Modality Worklist	
> Scheduled Protocol Code Sequence	(0040,0008)	SQ	From Modality Worklist	
> Scheduled Procedure Step ID	(0040,0009)	SH	From Modality Worklist	
> Requested Procedure ID	(0040,1001)	SH	From Modality Worklist	
Performed Series Sequence	(0040,0340)	SQ		

2.2.2.4 Association Acceptance Policy

The Workflow Application Entity does not accept Associations.

2.2.3. Print Application Entity Specification

2.2.3.1 SOP Classes

E-CUBE 5 provides Standard Conformance to the following SOP Classes:

Table 25: SOP CLASSES FOR AE HARDCOPY

SOP Class Name	SOP Class UID	SCU	SCP
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9	Yes	No
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18	Yes	No

2.2.3.2 Association Policies

2.2.3.2.1 General

The DICOM standard application context name for DICOM 3.0 is always proposed:

Table 26: DICOM APPLICATION CONTEXT FOR AE PRINT

Application Context Name	1.2.840.10008.3.1.1.1

2.2.3.2.2 Number of Associations

E-CUBE 5 initiates one Association at a time for each configured DICOM Print device. Multiple DICOM Print devices can be configured.

Table 27: NUMBER OF ASSOCIATIONS INITIATED FOR AE DICOM Print

Maximum number of simultaneous Associations	1

2.2.3.2.3 Asynchronous Nature

E-CUBE 5 does not support asynchronous communication.

2.2.3.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 28: DICOM IMPLEMENTATION CLASS AND VERSION FOR AE PRINT

Implementation Class UID	1.2.840.114480.3.5.4
Implementation Version Name	E-CUBE 5_01

2.2.3.3 Association Initiation Policy

2.2.3.3.1 Activity – Film Images

2.2.3.3.1.1 Description and Sequencing of Activities

A user composes images onto film sheets and requests them to be sent to a specific print device. The user can select the desired film format and number of copies. Each print-job is forwarded to the job queue and processed individually.

The Print AE is invoked by the job control interface that is responsible for processing network tasks. The job consists of data describing the images and graphics to be printed as well as the requested layout and other parameters. The film sheet is internally processed, converted to a STANDARD/1,1 page and then the page image is sent. If no association to the printer can be established, the print-job is switched to a failed

state and the user informed.

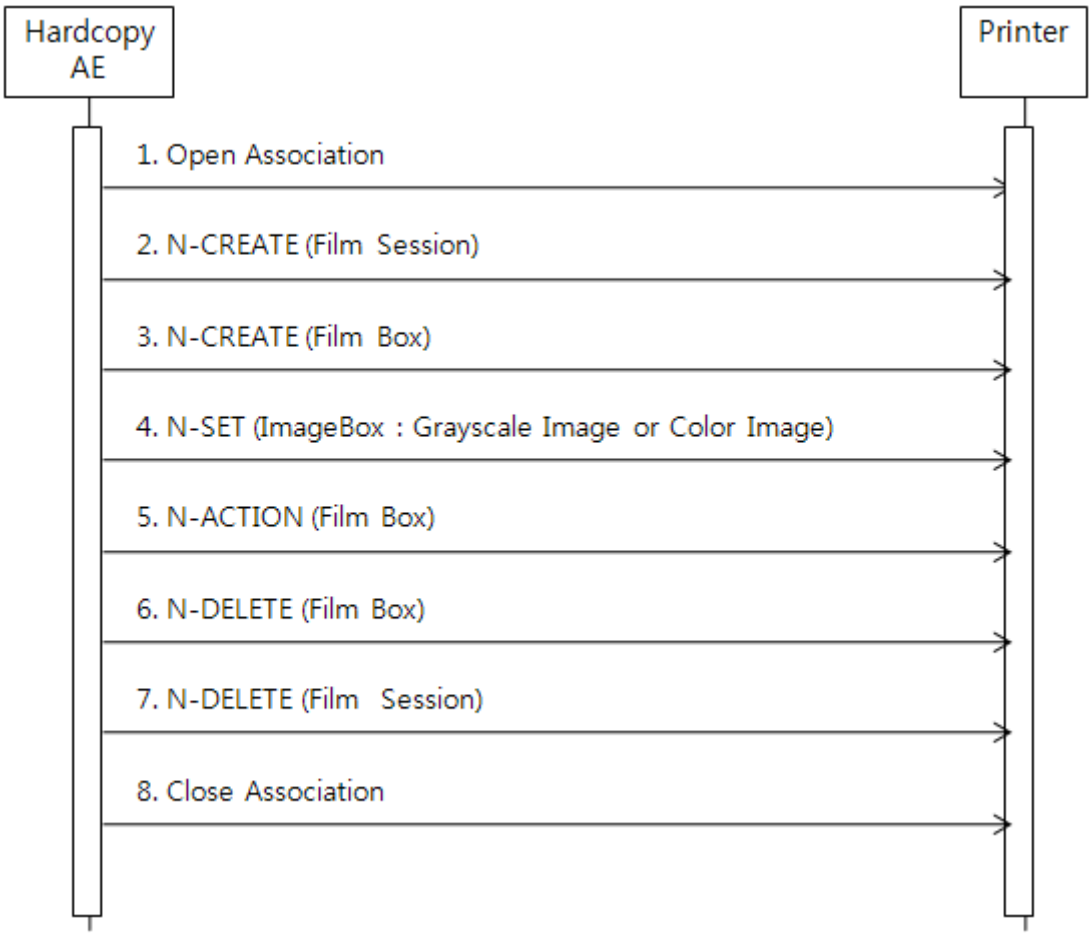

Figure 6: SEQUENCING OF ACTIVITY – FILM IMAGES

A typical sequence of DIMSE messages sent over an association between Hardcopy AE and a Printer is illustrated in Figure 5:

1. Print AE opens an association with the Printer
2. N-CREATE on the Film Session SOP Class creates a Film Session.
3. N-CREATE on the Film Box SOP Class creates a Film Box linked to the Film Session. A single Image Box will be created as the result of this operation (Hardcopy AE only uses the format STANDARD₩1,1)
4. N-SET on the Image Box SOP Class transfers the contents of the

film sheet to the printer.

5. N-ACTION on the Film Box SOP Class instructs the printer to print the Film Box
6. The printer prints the requested number of film sheets
7. N-DELETE on the Film Box SOP Class deletes the complete Film Box SOP Instance hierarchy.
8. N-DELETE on the Film Session SOP Class deletes the complete Film Session SOP Instance hierarchy.
9. Hardcopy AE closes the association with the Printer

Status of the print-job is reported through the job control interface. Only one job will be active at a time for each separate Print device. If any Response from the remote Application contains a status other than Success or Warning, the Association is aborted and the related Job is switched to a failed state. It can be restarted any time by user interaction or, if configured, by automated retry.

2.2.3.3.1.2 Presentation Contexts

E-CUBE 5 is capable of proposing the Presentation Contexts shown in the Table below:

Table 29: PROPOSED PRESENTATION CONTEXTS FOR ACTIVITY FILM IMAGES

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

2.2.3.3.1.3 Common SOP Specific Conformance for all Print SOP Classes

The general behavior of Hardcopy AE during communication failure is summarized in the Table below. This behavior is common for all SOP Classes supported by Print AE.

Table 30: PRINT COMMUNICATION FAILURE BEHAVIOR

Exception	Behavior
Timeout	The Association is aborted using A-ABORT and the print-job is marked as failed. The reason is logged and the job failure is reported to the user via the job control application.
Association aborted by the SCP or network layers	The print-job is marked as failed. The reason is logged and the job failure is reported to the user via the job control application.

2.2.3.3.1.4 SOP Specific Conformance for the Film Session SOP Class

Print AE supports the following DIMSE operations for the Film Session SOP Class:

— N-CREATE

— N-DELETE

Details of the supported attributes and status handling behavior are described in the following subsections.

2.2.3.3.1.4.1 Film Session SOP Class Operations (N-CREATE)

The attributes supplied in an N-CREATE Request are listed in the Table below:

Table 31: FILM SESSION SOP CLASS N-CREATE REQUEST ATTRIBUTES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Number of Copies	(2000,0010)	IS	1 .. 10	ALWAYS	User

Print Priority	(2000,0020)	CS	HIGH, MED, LOW	ALWAYS	User
Medium Type	(2000,0030)	CS	BLUE FILM, CLEAR FILM or PAPER	ALWAYS	User
Film Destination	(2000,0040)	CS	MAGAZINE or PROCESSOR	ALWAYS	User
Film Session Label	(2000.0050)	LO			

The behavior of Print AE when encountering status codes in a N-CREATE response is summarized in the Table below:

Table 32: FILM SESSION SOP CLASS N-CREATE RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has completed the operation successfully.
Warning	Attribute Value Out of Range	0116H	The N-CREATE operation is considered successful but the status meaning is logged. Additional information in the Response identifying the attributes out of range will be logged (i.e. Elements in the Modification List/Attribute List)
Warning	Attribute List Error	0107H	The N-CREATE operation is considered successful but the status meaning is logged. Additional information in the Response identifying the attributes will be logged (i.e. Elements in the Attribute Identifier List)
*	*	Any other status code.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

2.2.3.3.1.4.2 Film Session SOP Class Operations (N-DELETE)

The behavior of Print AE when encountering status codes in a N-DELETE response is summarized in the Table below:

Table 33: PRINTER SOP CLASS N-DELETE RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has completed the operation successfully.
*	*	Any other status	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is

		code.	logged and reported to the user.

2.2.3.3.1.5 SOP Specific Conformance for the Film Box SOP Class

Print AE supports the following DIMSE operations for the Presentation LUT SOP Class:

— N-CREATE

— N-ACTION

— N-DELETE

Details of the supported attributes and status handling behavior are described in the following subsections.

2.2.3.3.1.5.1 Film Box SOP Class Operations (N-CREATE)

The attributes supplied in an N-CREATE Request are listed in the Table below:

Table 34: FILM BOX SOP CLASS N-CREATE REQUEST ATTRIBUTES

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Display Format	(2010,0010)	CS	STANDARD\1,1	ALWAYS	Auto
Referenced Film Session Sequence	(2010,0500)	SQ		ALWAYS	Auto
> Referenced SOP Class UID	(0008,1150)	UI		ALWAYS	Auto
> Referenced SOP Instance UID	(0008,1155)	UI		ALWAYS	Auto
Film Orientation	(2010,0040)	CS	PORTRAIT or LANDSCAPE	ALWAYS	User
Film Size ID	(2010,0050)	CS	14INX17IN, 14INX14IN, 11INX14IN, 11INX11IN, 85INX11IN, 8INX10IN	ALWAYS	User
Magnification Type	(2010,0060)	CS	REPLICATE, BILINEAR, CUBIC or NONE	ALWAYS	User
Smoothing Type	(2010,0080)	CS	Only valid for Magnification Type		User

			(2010,0060) = CUBIC		
Border Density	(2010,0100)	CS	BLACK or WHITE	ALWAYS	User
Empty Image Density	(2010,1010)	CS	BLACK or WHITE		User
Max Density	(2010,0130)	US	0 .. 310	ALWAYS	Auto
Min Density	(2010,0120)	US	0 .. 50	ALWAYS	Auto
Trim	(2010,0140)	CS	YES or NO		User
Configuration Information	(2010,0150)	ST		ALWAYS	User

The behavior of Print AE when encountering status codes in a N-CREATE response is summarized in the Table below:

Table 35: FILM BOX SOP CLASS N-CREATE RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has completed the operation successfully.
Warning	Requested Min Density or Max Density outside of printer's operating range	B605H	The N-CREATE operation is considered successful but the status meaning is logged.
*	*	Any other status code.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

2.2.3.3.1.5.2 Film Box SOP Class Operations (N-ACTION)

An N-ACTION Request is issued to instruct the Print SCP to print the contents of the Film Box. The Action Reply argument in an N-ACTION response is not evaluated.

The behavior of Print AE when encountering status codes in a N-ACTION response is summarized in the Table below:

Table 36: FILM BOX SOP CLASS N-ACTION RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has completed the

			operation successfully. The film has been accepted for printing.
Warning	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (empty page)	B603H	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
Warning	Image size is larger than Image Box size. The image has been demagnified.	B604H	The N-ACTION operation is considered successful but the status meaning is logged.
Warning	Image size is larger than Image Box size. The image has been cropped to fit.	B609H	The N-ACTION operation is considered successful but the status meaning is logged.
Warning	Image size or Combined Print Image Size is larger than Image Box size. The image or combined Print Image has been decimated to fit.	B60AH	The N-ACTION operation is considered successful but the status meaning is logged.
Failure	Unable to create Print Job SOP Instance; print queue is full.	C602	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
Failure	Image size is larger than Image Box size.	C603	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
Failure	Combined Print Image Size is larger than Image Box size.	C613	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
*	*	Any other status code.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

2.2.3.3.1.5.3 Film Box SOP Class Operations (N-DELETE)

The behavior of Print AE when encountering status codes in a N-DELETE response is summarized in the Table below:

Table 37: PRINTER SOP CLASS N-DELETE RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has completed the operation successfully.
*	*	Any other status code.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

2.2.3.3.1.6 SOP Specific Conformance for the Image Box SOP Class

Print AE supports the following DIMSE operations for the Image Box SOP Class:

— N-SET

Details of the supported attributes and status handling behavior are described in the following subsections.

2.2.3.3.1.6.1 Image Box SOP Class Operations (N-SET)

The attributes supplied in an N-SET Request are listed in the Table below:

Table 38: IMAGE BOX SOP CLASS N-SET REQUEST ATTRIBUTES (GRAYSCALE IMAGE)

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Position	(2020,0010)	US	1	ALWAYS	Auto
Basic Grayscale Image Sequence	(2020,0110)	SQ		ALWAYS	Auto
>Samples Per Pixel	(0028,0002)	US	1	ALWAYS	Auto
>Photometric Interpretation	(0028,0004)	CS	MONOCHROME2	ALWAYS	Auto
>Rows	(0028,0010)	US	Depends on film size	ALWAYS	Auto
>Columns	(0028,0011)	US	Depends on film size	ALWAYS	Auto

>Pixel Aspect Ratio	(0028,0034)	IS	1\1	ALWAYS	Auto
>Bits Allocated	(0028,0100)	US	8	ALWAYS	Auto
>Bits Stored	(0028,0101)	US	8	ALWAYS	Auto
>High Bit	(0028,0102)	US	7	ALWAYS	Auto
>Pixel Representation	(0028,0103)	US	0	ALWAYS	Auto
>Pixel Data	(7FE0,0010)	OB	Pixels of rendered film sheet	ALWAYS	Auto

(COLOR IMAGE)

Attribute Name	Tag	VR	Value	Presence of Value	Source
Image Position	(2020,0010)	US	1	ALWAYS	Auto
Basic Color Image Sequence	(2020,0111)	SQ		ALWAYS	Auto
>Samples Per Pixel	(0028,0002)	US	3	ALWAYS	Auto
>Photometric Interpretation	(0028,0004)	CS	RGB	ALWAYS	Auto
>Planar Configuration	(0028,0006)	US	0	ALWAYS	Auto
>Rows	(0028,0010)	US	Depends on film size	ALWAYS	Auto
>Columns	(0028,0011)	US	Depends on film size	ALWAYS	Auto
>Pixel Aspect Ratio	(0028,0034)	IS	1\1	ALWAYS	Auto
>Bits Allocated	(0028,0100)	US	8	ALWAYS	Auto
>Bits Stored	(0028,0101)	US	8	ALWAYS	Auto
>High Bit	(0028,0102)	US	7	ALWAYS	Auto
>Pixel Representation	(0028,0103)	US	0	ALWAYS	Auto
>Pixel Data	(7FE0,0010)	OB	Pixels of rendered film sheet	ALWAYS	Auto

The behavior of Print AE when encountering status codes in a N-SET response is summarized in the Table below:

Table 39: IMAGE BOX SOP CLASS N-SET RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has completed the operation successfully. Image successfully stored in Image Box.
Warning	Image size is larger than Image Box size. The image has been demagnified.	B604H	The N-SET operation is considered successful but the status meaning is logged.
Warning	Requested Min Density or Max Density outside of printer's operating range.	B605H	The N-SET operation is considered successful but the status meaning is logged.
Warning	Image size is larger than Image Box size. The image has been cropped to fit.	B609H	The N-SET operation is considered successful but the status meaning is logged.
Warning	Image size or Combined Print Image Size is larger than Image Box size. The image or combined Print Image has been decimated to fit.	B60AH	The N-SET operation is considered successful but the status meaning is logged.
Failure	Image size is larger than Image Box size.	C603	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
Failure	Insufficient memory in printer to store the image.	C605	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
Failure	Combined Print Image Size is larger than Image Box size.	C613	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
*	*	Any other status code.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

3 MEDIA INTERCHANGE

3.1 IMPLEMENTATION MODEL

3.1.1 Application Data Flow

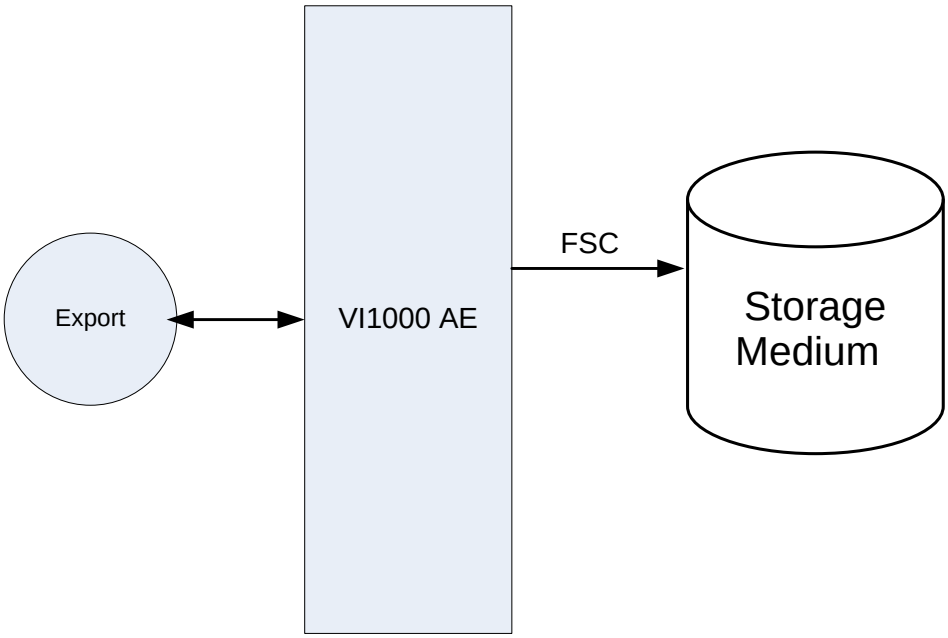

Figure 7: APPLICATION DATA FLOW DIAGRAM FOR MEDIA STORAGE

— The Offline-Media Application Entity exports images and DICOMDir to a CD-R or DVD-R Storage medium. It is associated with the local real-world activity "Export to CD-R or DVD- R". "Export to CD-R or DVD- R" is performed upon user request for selected patients, studies, series or instances (images or report).

3.1.2 Functional Definition of AEs

3.1.2.1 Functional Definition of Offline-Media Application Entity

- Create new DICOM file-set on media

3.1.3 Sequencing of Real-World Activities

Activation of the "Export" menu entry will pass the currently selected patients, studies, series or instances (images or report) to the Offline-Media Application Entity. The SOP Instances associated with the selection will be collected into one

or more export jobs. The contents of each export job will be written to a single CD-R or DVD –R media.

3.1.4 File Meta Information Options

The implementation information written to the File Meta Header in each file is:

Table 40: DICOM IMPLEMENTATION CLASS AND VERSION FOR MEDIA STORAGE

Implementation Class UID	1.2.840.114480.3.5.4
Implementation Version Name	E-CUBE 5_01

3.2 AE SPECIFICATIONS

3.2.1 Offline-Media Application Entity Specification

The Offline-Media Application Entity provides standard conformance to the Media Storage Service Class. The Application Profiles and roles are listed below:

Table 41: APPLICATION PROFILES, ACTIVITIES AND ROLES FOR OFFLINE-MEDIA

Application Profiles Supported	Real World Activity	Role
STD-GEN-CD	Export	FSC

3.2.1.1 File Meta Information for the Application Entity

The Source Application Entity Title included in the File Meta Header is configurable (see section 3.3).

3.2.1.2 Real-World Activities

3.2.1.2.1 Activity – Export

The Offline-Media Application Entity acts as an FSC when requested to export SOP Instances from the local database to a CD-R medium.

A dialogue will be presented allowing the user to modify the suggested media label and provides control over the available media capacity. The contents of the export job will be written together with a corresponding DICOMDIR to a single-session CDR. Writing in multi-session mode is not supported. The user can cancel an export job in the job queue.

3.2.1.2.1.1 Media Storage Application Profiles

The Offline-Media Application Entity support the STD-GEN-CD Application Profile.

3.2.1.2.1.1.1 Options

The Offline-Media Application Entity supports the SOP Classes and Transfer Syntaxes listed in the Table below:

Table 42: IODS, SOP CLASSES AND TRANSFER SYNTAXES FOR OFFLINEMEDIA

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	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	1.2.840.10008.1.2.1
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1

3.3 MEDIA CONFIGURATION

The Application Entity Titles configurable for Media Services are listed in the Table below:

Table 43: AE TITLE CONFIGURATION TABLE

Application Entity	Default AE Title
Offline-Media	E-CUBE 5_01 (Configurable)

4. US IMAGE INFORMATION OBJECT IMPLEMENTATION

4.1 US IOD IMPLEMENTATION

The Ultrasound (US) Image Information Object Definition specifies an image that has been created by an ultrasound imaging device.

4.2 US ENTITY-RELATIONSHIP MODEL

This Section of an IOD provides the Entity-Relationship (E-R) Model which depicts the relationships of the components or Information Entities (IE) of the specified IOD. It forms an IOD specific information model. In this figure, the following diagrammatic convention is established to represent the information organization

- Each entity is represented by rectangular box
- Each relationship is represented by a diamond shaped box
- The fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes

The relationships are fully defined with the maximum number of possible entities in the relationship shown

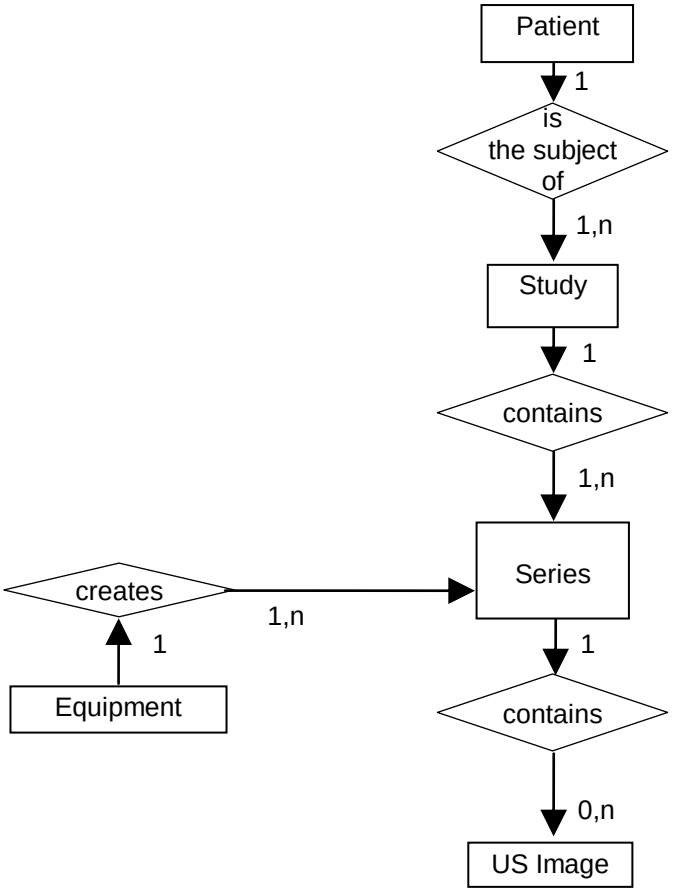

Figure 8: US IMAGE ENTITY RELATIONSHIP DIAGRAM

4.2.1 ENTITY DESCRIPTION

Refer to DICOM Standard Part3 (Information Object Definition) for a description of each of the entities contained within the US Information Object

4.3 IOD MODULE TABLE

Within an entity of the DICOM US IOD, attributes are grouped into related set of attributes. A set of related attributes is termed a module.

Table 44: US IMAGE IOD MODULES

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
Series	General Series	C.7.3.1	M
Frame of Reference	Frame of Reference	C.7.4.1	U
Equipment	General Equipment	C.7.5.1	M
Image	General Image	C.7.6.1	M
	Image Pixel	C.7.6.3	M
	Contrast/bolus	C.7.6.4	C - Required if contrast media was used in this image
	Palette Color Lookup Table	C.7.9	C - Required if Photometic Interpretation (0028,0004) has a value of PALETTE COLOR
	US Region Calibration	C.8.5.5	U
	US Image	C.8.5.6	M
	Overlay Plane	C.9.2	U
	VOI LUT	C.11.2	U
	SOP Common	C.12.1	M

4.4 INFORMATION MODULE DEFINITIONS

4.4.1 COMMON COMPOSITE IMAGE IOD MODULE

4.4.1.1 COMMON PATIENT IE MODULE

The following Table specifies the Attributes of the Patient that describe and identify the Patient who is the subject of a diagnostic Study. This Module contains Attributes of the patient that are needed for diagnostic interpretation of the Image and are common for all studies performed on the patient. It contains Attributes that are also included in the Patient Modules in Section C.2.

Table 45: PATIENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Patient's Name	(0010,0010)	2	Patient's full name.
Patient ID	(0010,0020)	2	Primary hospital identification number or code for the patient.
Issuer of Patient ID	(0010,0021)	3	Identifier of the Assigning Authority that issued the Patient ID.
Patient's Birth Date	(0010,0030)	2	Birth date of the patient.
Patient's Sex	(0010,0040)	2	Sex of the named patient. Enumerated Values: M = male F = female O = other
Referenced Patient Sequence	(0008,1120)	3	A sequence that provides reference to a Patient SOP Class/Instance pair. Only a single Item shall be permitted in this Sequence.
Patient's Birth Time	(0010,0032)	3	Birth time of the Patient.
Other Patient IDs	(0010,1000)	3	Other identification numbers or codes used to identify the patient.
Other Patient IDs Sequence	(0010,1002)	3	A sequence of identification numbers or codes used to identify the patient, which may or may not be human readable, and may or may not have been obtained from an implanted or attached device such as an RFID or barcode. If present, shall contain one or more items.
>Patient ID	(0010,0020)	1	An identification number or code used to identify the patient.
>Issuer of Patient ID	(0010,0021)	1	Identifier of the Assigning Authority that issued the Patient ID.
>Type of Patient ID	(0010,0022)	1	The type of identifier in this item. Defined Terms: TEXT RFID BARCODE Note: The identifier is coded as a string regardless of the type, not as a binary value.
Other Patient Names	(0010,1001)	3	Other names used to identify the patient.
Ethnic Group	(0010,2160)	3	Ethnic group or race of the patient.

Patient Comments	(0010,4000)	3	User-defined additional information about the patient.

4.4.1.2 COMMON STUDY IE MODULE

4.4.1.2.1 GENERAL STUDY MODULE

Below table specifies the Attributes that describe and identify the Study performed upon the Patient.

Table 46: GENERAL STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Study Instance UID	(0020,000D)	1	Unique identifier for the Study.
Study Date	(0008,0020)	2	Date the Study started.
Study Time	(0008,0030)	2	Time the Study started.
Referring Physician's Name	(0008,0090)	2	Name of the patient's referring physician
Referring Physician Identification Sequence	(0008,0096)	3	Identification of the patient's referring physician. Only a single item shall be permitted in this sequence.
Study ID	(0020,0010)	2	User or equipment generated Study identifier.
Accession Number	(0008,0050)	2	A RIS generated number that identifies the order for the Study.
Study Description	(0008,1030)	3	Institution-generated description or classification of the Study (component) performed.
Physician(s) of Record	(0008,1048)	3	Names of the physician(s) who are responsible for overall patient care at time of Study
Physician(s) of Record Identification Sequence	(0008,1049)	3	Identification of the physician(s) who are responsible for overall patient care at time of Study. One or more items shall be included in this sequence. If more than one Item, the number and order shall correspond to the value of Physician(s) of Record (0008,1048), if present.
Name of Physician(s) Reading Study	(0008,1060)	3	Names of the physician(s) reading the Study.
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Identification of the physician(s) reading the Study. One or more items shall be included in this sequence. If more than one Item, the number and

			order shall correspond to the value of Name of Physician(s) Reading Study (0008,1060), if present.
Referenced Study Sequence	(0008,1110)	3	A sequence that provides reference to a Study SOP Class/Instance pair. The sequence may have zero or more Items.
Procedure Code Sequence	(0008,1032)	3	A Sequence that conveys the type of procedure performed. One or more Items may be included in this Sequence.

4.4.1.2.2 PATIENT STUDY MODULE

The following Table defines Attributes that provide information about the Patient at the time the Study was performed.

Table 47: PATIENT STUDY MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Admitting Diagnoses Description	(0008,1080)	3	Description of the admitting diagnosis (diagnoses)
Admitting Diagnoses Code Sequence	(0008,1084)	3	A sequence that conveys the admitting diagnosis (diagnoses). One or more Items may be included in this Sequence.
Patient's Age	(0010,1010)	3	Age of the Patient.
Patient's Size	(0010,1020)	3	Length or size of the Patient, in meters.
Patient's Weight	(0010,1030)	3	Weight of the Patient, in kilograms.
Occupation	(0010,2180)	3	Occupation of the Patient.
Additional Patient's History	(0010,21B0)	3	Additional information about the Patient's medical history.
Admission ID	(0038,0010)	3	Identification number of the visit as assigned by the healthcare provider
Issuer of Admission ID	(0038,0011)	3	Name of healthcare provider that issued the Admission ID
Service Episode ID	(0038,0060)	3	Identifier of the Service Episode as assigned by the healthcare provider
Issuer of Service Episode ID	(0038,0061)	3	Name of healthcare provider that issued the Service Episode ID
Service Episode Description	(0038,0062)	3	Description of the type of service episode.
Patient's Sex Neutered	(0010,2203)	2C	Whether or not a procedure has been performed in an effort to render the patient sterile. Enumerated value: ALTERED = Altered/Neutered UNALTERED = Unaltered/intact Note: If this Attribute is present but has no value then the status is unknown. Required if patient is an animal. May be present otherwise.

4.4.1.3 COMMON SERIES IE MODULE

4.4.1.3.1 GENERAL SERIES MUODULE

The following Table specifies the Attributes that identify and describe general information about the Series within a Study.

Table 48: GENERAL SERIES MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Modality	(0008,0060)	1	Type of equipment that originally acquired the data used to create the images in this Series.
Series Instance UID	(0020,000E)	1	Unique identifier of the Series.
Series Number	(0020,0011)	2	A number that identifies this Series.
Laterality	(0020,0060)	2C	Laterality of (paired) body part examined. Required if the body part examined is a paired structure and Image Laterality (0020,0062) or Frame Laterality (0020,9072) are not sent. Enumerated Values: R = right L = left Note: Some IODs support Image Laterality (0020,0062) at the Image level or Frame Laterality(0020,9072) at the Frame level in the Frame Anatomy functional group macro, which can provide a more comprehensive mechanism for specifying the laterality of the body part(s) being examined.
Series Date	(0008,0021)	3	Date the Series started.
Series Time	(0008,0031)	3	Time the Series started.
Performing Physicians' Name	(0008,1050)	3	Name of the physician(s) administering the Series.
Performing Physician Identification Sequence	(0008,1052)	3	Identification of the physician(s) administering the Series. One or more items shall be included in this sequence. If more than one Item, the number and order shall correspond to the value of Performing Physicians' Name (0008,1050), if present.
Protocol Name	(0018,1030)	3	User-defined description of the conditions under which the Series was performed. Note: This attribute conveys series-specific protocol identification and may or may not be identical to the one presented in the Performed Protocol Code Sequence (0040,0260).
Series Description	(0008,103E)	3	User provided description of the Series

Operators' Name	(0008,1070)	3	Name(s) of the operator(s) supporting the Series.
Operator Identification Sequence	(0008,1072)	3	Identification of the operator(s) supporting the Series. One or more items shall be included in this sequence. If more than one Item, the number and order shall correspond to the value of Operators' Name (0008,1070), if present.
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Uniquely identifies the Performed Procedure Step SOP Instance to which the Series is related (e.g. a Modality or General-Purpose Performed Procedure Step SOP Instance). The Sequence shall have zero or one Item.
Related Series Sequence	(0008,1250)	3	Identification of Series significantly related to this Series. Zero or more Items may be present. Notes: 1. For example, for a combined CT and PET acquisition, the CT images and PET images would be in separate series that could cross-reference each other with multiple purpose of reference codes meaning same anatomy, simultaneously acquired and same indication. 2. The related series may have different Frames of Reference and hence require some sort of registration before spatial coordinates can be directly compared. 3. This attribute is not intended for conveying localizer reference information, for which Referenced Image Sequence (0008,1140) should be used.
>Study Instance UID	(0020,000D)	1	Instance UID of Study to which the related Series belongs
>Series Instance UID	(0020,000E)	1	Instance UID of Related Series
>Purpose of Reference Code Sequence	(0040,A170)	2	Describes the purpose for which the reference is made. Zero or more Items may be present. When absent, implies that the reason for the reference is unknown.
Body Part Examined	(0018,0015)	3	Text description of the part of the body examined. See PS 3.16 Annex on Correspondence of Anatomic Region Codes and Body Part Examined for

			Defined Terms Note: Some IODs support the Anatomic Region Sequence (0008,2218), which can provide a more comprehensive mechanism for specifying the body part being examined.
Patient Position	(0018,5100)	2C	Patient position descriptor relative to the equipment. Required for CT and MR images; shall not be present if Patient Orientation Code Sequence (0054,0410) is present; may be present otherwise.
Smallest Pixel Value in Series	(0028,0108)	3	The minimum value of all images in this Series.
Largest Pixel Value in Series	(0028,0109)	3	The maximum value of all images in this Series.
Request Attributes Sequence	(0040,0275)	3	Sequence that contains attributes from the Imaging Service Request. The sequence may have one or more Items.

4.4.1.4 COMMON FRAME OF REFERENCE INFORMATION ENTITY MODULES

4.4.1.4.1 FRAME OF REFERENCE MODULE

The Table in the below specifies the Attributes necessary to uniquely identify a frame of reference which insures the spatial relationship of Images within a Series. It also allows Images across multiple Series to share the same Frame Of Reference. This Frame Of Reference (or coordinate system) shall be constant for all Images related to a specific Frame Of Reference.

When a Frame of Reference is identified, it is not important how the Patient is positioned relative to the imaging equipment or where the origin of the Frame Of Reference is located. It is important that the position of the Patient and the origin are constant in relationship to a specific Frame Of Reference.

Table 49: FRAME OF REFERENCE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Frame of Reference UID	(0020,0052)	1	Uniquely identifies the frame of reference for a Series.
Position Reference Indicator	(0020,1040)	2	Part of the patient's anatomy used as a reference, such as the iliac crest, orbital-medial, sternal notch, symphysis pubis, xiphoid, lower coastal margin, external auditory meatus.

4.4.1.5 COMMON EQUIPMENT MODULES

The following Equipment IE Module is common to all Composite IODs that reference the Equipment IE.

4.4.1.5.1 GENERAL EQUIPMENT MODULE

The following table specifies the Attributes that identify and describe the piece of equipment that produced a Series of Composite Instances.

Table 50: GENERAL EQUIPMENT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Manufacturer	(0008,0070)	2	Manufacturer of the equipment that produced the composite instances.
Institution Name	(0008,0080)	3	Institution where the equipment that produced the composite instances is located.
Institution Address	(0008,0081)	3	Mailing address of the institution where the equipment that produced the composite instances is located.
Station Name	(0008,1010)	3	User defined name identifying the machine that produced the composite instances.
Institutional Department Name	(0008,1040)	3	Department in the institution where the equipment that produced the composite instances is located.
Manufacturer's Model Name	(0008,1090)	3	Manufacturer’s model name of the equipment that produced the composite instances.
Device Serial Number	(0018,1000)	3	Manufacturer’s serial number of the equipment that produced the

			composite instances.
Software Versions	(0018,1020)	3	Manufacturer's designation of software version of the equipment that produced the composite instances.
Gantry ID	(0018,1008)	3	Identifier of the gantry or positioner.
Spatial Resolution	(0018,1050)	3	The inherent limiting resolution in mm of the acquisition equipment for high contrast objects for the data gathering and reconstruction technique chosen. If variable across the images of the series, the value at the image center.
Date of Last Calibration	(0018,1200)	3	Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times.
Time of Last Calibration	(0018,1201)	3	Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used
Pixel Padding Value	(0028,0120)	1C	Single pixel value or one limit (inclusive) of a range of pixel values used in animage to pad to rectangular format or to signal background that may be suppressed. Required if Pixel Padding Range Limit (0028,0121) is present. May be present otherwise.

4.4.1.6 COMMON IMAGE MODULES

4.4.1.6.1 GENERAL IMAGE MODULE

Table 51: GENERAL IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Instance Number	(0020,0013)	2	A number that identifies this image.
Patient Orientation	(0020,0020)	2C	Patient direction of the rows and columns of the image. Required if image does not require Image Orientation (Patient) (0020,0037) and Image Position (Patient) (0020,0032).
Content Date	(0008,0023)	2C	The date the image pixel data creation started. Required if image is part of a series in which the images are temporally related.

Content Time	(0008,0033)	2C	The time the image pixel data creation started. Required if image is part of a series in which the images are temporally related.
Image Type	(0008,0008)	3	Image identification characteristics.
Acquisition Number	(0020,0012)	3	A number identifying the single continuous gathering of data over a period of time that resulted in this image.
Acquisition Date	(0008,0022)	3	The date the acquisition of data that resulted in this image started
Acquisition Time	(0008,0032)	3	The time the acquisition of data that resulted in this image started
Acquisition DateTime	(0008,002A)	3	The date and time that the acquisition of data that resulted in this image started.
Referenced Image Sequence	(0008,1140)	3	A sequence that references other images significantly related to this image (e.g. post-localizer CT image or Mammographic biopsy or partial view images). One or more Items may be included in this sequence.
>Purpose of Reference Code Sequence	(0040,A170)	3	Describes the purpose for which the reference is made. Only a single Item shall be permitted in this sequence.
Derivation Description	(0008,2111)	3	A text description of how this image was derived
Derivation Code Sequence	(0008,9215)	3	A coded description of how this image was derived. One or more Items may be included in this Sequence. More than one Item indicates that successive derivation steps have been applied.
Source Image Sequence	(0008,2112)	3	A Sequence that identifies the set of Image SOP Class/Instance pairs of the Images that were used to derive this Image. Zero or more Items may be included in this Sequence.
>Purpose of Reference Code Sequence	(0040,A170)	3	Describes the purpose for which the reference is made, that is what role the source image or frame(s) played in the derivation of this image. Only a single Item shall be permitted in this sequence.

>Spatial Locations Preserved	(0028,135A)	3	The extent to which the spatial locations of all pixels are preserved during the processing of the source image that resulted in the current image Enumerated Values: YES NO REORIENTED_ONLY - A projection radiograph that has been flipped, and/or rotated by a multiple of 90 degrees
>Patient Orientation	(0020,0020)	1C	The Patient Orientation values of the source image. Required if the value of Spatial Locations Preserved (0028,135A) is REORIENTED_ONLY.
Referenced Instance Sequence	(0008,114A)	3	A sequence which provides reference to a set of non-image SOP Class/Instance pairs significantly related to this Image, including waveforms that may or may not be temporally synchronized with this image . One or more Items may be included in this sequence.
>Purpose of Reference Code Sequence	(0040,A170)	1	Code describing the purpose of the reference to the Instance(s). Only a single Item shall be permitted in this sequence.
Images in Acquisition	(0020,1002)	3	Number of images that resulted from this acquisition of data
Image Comments	(0020,4000)	3	User-defined comments about the image
Quality Control Image	(0028,0300)	3	Indicates whether or not this image is a quality control or phantom image. Enumerated Values: YES NO If this Attribute is absent, then the image may or may not be a quality control or phantom image. The phantom device in the image can be described using the Device Module.
Burned In Annotation	(0028,0301)	3	Indicates whether or not image

			contains sufficient burned in annotation to identify the patient and date the image was acquired. Enumerated Values: YES NO If this Attribute is absent, then the image may or may not contain burned in annotation.
Lossy Image Compression	(0028,2110)	3	Specifies whether an Image has undergone lossy compression. Enumerated Values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected to lossy compression.
Lossy Image Compression Ratio	(0028,2112)	3	Describes the approximate lossy compression ratio(s) that have been applied to this image. May be multivalued if successive lossy compression steps have been applied.
Lossy Image Compression Method	(0028,2114)	3	A label for the lossy compression method(s) that have been applied to this image. May be multivalued if successive lossy compression steps have been applied; the value order shall correspond to the values of Lossy Image Compression Ratio (0028,2112).
Icon Image Sequence	(0088,0200)	3	This icon image is representative of the Image. Only a single Item shall be permitted in this Sequence.
Presentation LUT Shape	(2050,0020)	3	When present, specifies an identity transformation for the Presentation LUT such that the output of all grayscale transformations, if any, are defined to be in P-Values. Enumerated Values are: IDENTITY - output is in P-Values - shall be used if Photometric Interpretation (0028,0004) is MONOCHROME2 or any color

			photometric interpretation. INVERSE - output after inversion is in P-Values - shall be used if Photometric Interpretation (0028,0004) is MONOCHROME1. When this attribute is used with a color photometric interpretation then the luminance component is in P-Values.
Irradiation Event UID	(0008,3010)	3	Unique identification of the irradiation event(s) associated with the acquisition of this image.

4.4.1.6.2 IMAGE PIXEL MODULE

The following table describes the Image Pixel Module.

Table 52: IMAGE PIXEL MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Pixel Data Provider URL	(0028,7FE0)	1C	A URL of a provider service that supplies the pixel data of the Image. Required if the image is to be transferred in one of the following presentation contexts identified by Transfer Syntax UID: 1.2.840.10008.1.2.4.94 (DICOM JPIP Referenced Transfer Syntax) 1.2.840.10008.1.2.4.95 (DICOM JPIP Referenced Deflate Transfer Syntax)
Pixel Padding Range Limit	(0028,0121)	1C	Pixel value that represents one limit (inclusive) of a range of padding values used together with Pixel Padding Value (0028,0120) as defined in the General Equipment Module. Required if pixel padding is to be defined as a range rather than a single value.

The following table specifies the common attributes that describe the pixel data of the image.

Table 53: IMAGE PIXEL MACRO ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Samples per Pixel	(0028,0002)	1	Number of samples (planes) in this image.
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of the pixel data.
Rows	(0028,0010)	1	Number of rows in the image.
Columns	(0028,0011)	1	Number of columns in the image
Bits Allocated	(0028,0100)	1	Number of bits allocated for each pixel sample. Each sample shall have the same number of bits allocated. See PS 3.5 for further explanation.
Bits Stored	(0028,0101)	1	Number of bits stored for each pixel sample. Each sample shall have the same number of bits stored. See PS 3.5 for further explanation.
High Bit	(0028,0102)	1	Most significant bit for pixel sample data. Each sample shall have the same high bit. See PS 3.5 for further explanation.
Pixel Representation	(0028,0103)	1	Data representation of the pixel samples. Each sample shall have the same pixel representation. Enumerated Values: 0000H = unsigned integer. 0001H = 2's complement
Pixel Data	(7FE0,0010)	1C	A data stream of the pixel samples that comprise the Image. Required if Pixel Data Provider URL (0028,7FE0) is not present.
Planar Configuration	(0028,0006)	1C	Indicates whether the pixel data are sent color-by-plane or color-by-pixel. Required if Samples per Pixel (0028,0002) has a value greater than 1.
Pixel Aspect Ratio	(0028,0034)	1C	Ratio of the vertical size and horizontal size of the pixels in the image specified by a pair of integer values where the first value is the vertical pixel size, and the second value is the horizontal pixel size. Required if the aspect ratio values do not have a ratio of 1:1 and the physical pixel spacing is not specified by Pixel Spacing (0028,0030), or Imager Pixel Spacing

			(0018,1164) or Nominal Scanned Pixel Spacing (0018,2010), either for the entire Image or per-frame in a Functional Group Macro
Smallest Image Pixel Value	(0028,0106)	3	The minimum actual pixel value encountered in this image.
Largest Image Pixel Value	(0028,0107)	3	The maximum actual pixel value encountered in this image.
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	Specifies the format of the Red Palette Color Lookup Table Data (0028,1201) Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR or Pixel Presentation (0008,9205) at the image level equals COLOR or MIXED
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Specifies the format of the Green Palette Color Lookup Table Data (0028,1202) Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR or Pixel Presentation (0008,9205) at the image level equals COLOR or MIXED.
Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Specifies the format of the Blue Palette Color Lookup Table Data (0028,1203) Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR or Pixel Presentation (0008,9205) at the image level equals COLOR or MIXED.
Red Palette Color Lookup Table Data	(0028,1201)	1C	Red Palette Color Lookup Table Data. Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR or Pixel Presentation (0008,9205) at the image level equals COLOR or MIXED.
Green Palette Color Lookup Table Data	(0028,1202)	1C	Green Palette Color Lookup Table Data. Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR or Pixel Presentation (0008,9205) at the image level equals COLOR or MIXED.
Blue Palette Color Lookup Table Data	(0028,1203)	1C	Blue Palette Color Lookup Table Data. Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR or Pixel Presentation (0008,9205) at the image level equals

			COLOR or MIXED.
ICC Profile	(0028,2000)	3	An ICC Profile encoding the transformation of device-dependent color stored pixel values into PCS-Values.When present, defines the color space of color Pixel Data (7FE0,0010) values, and the output of Palette Color Lookup Table Data (0028,1201-1203).

4.4.1.6.3 CONTRAST/BOLUS MODULE

The following table specifies the Attributes that describe the contrast /bolus used in the acquisition of the Image.

Table 54: CONTRAST/BOLUS MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Contrast/Bolus Agent	(0018,0010)	2	Contrast or bolus agent
Contrast/Bolus Agent Sequence	(0018,0012)	3	Sequence that identifies the contrast agent. One or more Items may be present.
Contrast/Bolus Route	(0018,1040)	3	Administration route of contrast agent
Contrast/Bolus Administration Route Sequence	(0018,0014)	3	Sequence that identifies the route of administration of contrast agent. Only a single Item shall be permitted in this sequence.
>Additional Drug Sequence	(0018,002A)	3	Sequence that identifies any additional drug that is administered with the contrast agent bolus. One or more Items may be present.
Contrast/Bolus Volume	(0018,1041)	3	Volume injected in milliliters of diluted contrast agent
Contrast/Bolus Start Time	(0018,1042)	3	Time of start of injection
Contrast/Bolus Stop Time	(0018,1043)	3	Time of end of contrast injection
Contrast/Bolus Total Dose	(0018,1044)	3	Total amount in milliliters of the undiluted contrast agent
Contrast Flow Rate	(0018,1046)	3	Rate(s) of injection(s) in milliliters/sec
Contrast Flow Duration	(0018,1047)	3	Duration(s) of injection(s) in seconds. Each Contrast Flow Duration value

			shall correspond to a value of Contrast Flow Rate (0018,1046).
Contrast/Bolus Ingredient	(0018,1048)	3	Active ingredient of agent. Defined Terms: IODINE GADOLINIUM CARBON DIOXIDE BARIUM
Contrast/Bolus Ingredient Concentration	(0018,1049)	3	Milligrams of active ingredient per milliliter of (diluted) agent

4.4.1.6.4 US Region Calibration Module

The US Region Calibration Module has been introduced into the ultrasound IOD to provide access to the full range of data that may be present in a single US image. US images often contain multiple regions that have independent data regions, e.g. quad screen loops that may have different calibration information. The data presented in the various regions of a US image can represent a multiplicity of physical parameters, e.g., spatial distance, blood velocity, time, volume, etc., and these are often contained in the value of the pixel itself. It is therefore imperative that physical information be available for the various regions of a single region independent of each other.

The table in below contains IOD Attributes that describe an ultrasound region calibration.

Table 55: US REGION CALIBRATION MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Sequence of Ultrasound Regions	(0018,6011)	1	Defines a sequence of Ultrasound Regions. One or more Items may be included in this Sequence.
>Region Location Min x_0	(0018,6018)	1	The bounds of a rectangle specifying the location of the region, x_0,y_0,x_1,y_1.
>Region Location Min y_0	(0018,601A)	1	The bounds of a rectangle specifying the location of the region, x_0,y_0,x_1,y_1.
>Region Location Max x_1	(0018,601C)	1	The bounds of a rectangle specifying the location of the region, x_0,y_0,x_1,y_1.

>Region Location Max y_1	(0018,601E)	1	The bounds of a rectangle specifying the location of the region, x_0,y_0,x_1,y_1.
>Physical Units X Direction	(0018,6024)	1	The physical units of the dimensions of the region.
>Physical Units Y Direction	(0018,6026)	1	The physical units of the dimensions of the region.
>Physical Delta X	(0018,602C)	1	The physical value increments per positive X pixel increment. The units are as specified in the Physical Units X Direction (0018,6024)..
>Physical Delta Y	(0018,602E)	1	The physical value increments per positive Y pixel increment. The units are as specified in the Physical Units Y Direction (0018,6026)..
>Reference Pixel x_0	(0018,6020)	3	This coordinate pair, x_0,y_0 defines the location of a virtual "reference" pixel.
>Reference Pixel y_0	(0018,6022)	3	This coordinate pair, x_0,y_0 defines the location of a virtual "reference" pixel.
>Ref. Pixel Physical Value X	(0018,6028)	3	The Physical Value at the reference pixel x location. The units are specified in the Physical Units field.
>Ref. Pixel Physical Value Y	(0018,602A)	3	The Physical Value at the reference pixel y location. The units are specified in the Physical Units field.
>Region Spatial Format	(0018,6012)	1	The spatial organization of the data within the region.
>Region Data Type	(0018,6014)	1	The type of data within the region.
>Region Flags	(0018,6016)	1	Flags used for special handling of the region.
>Pixel Component Organization	(0018,6044)	1C	Describes how the components of a pixel can be described. Required if pixel component calibration exists for this region.
>Pixel Component Mask	(0018,6046)	1C	This value is ANDed with the composite pixel code for each pixel within the region, then shifted right by the number of contiguous least significant zeros in the mask to obtain what will be referred to as the "Shifted Masked Composite Pixel Code" (SMCPC). Required if Pixel Component Organization = Bit aligned.
>Pixel Component Range Start	(0018,6048)	1C	Defines the start of the numeric range

			of values within the composite pixel where calibration is to be defined by the "pixel physical calibration table". To be used only when ranges are used to describe the portion of the composite pixel. Required if Pixel Component Organization = Ranges.
>Pixel Component Range Stop	(0018,604A)	1C	Defines the stop of the numeric range of values within the composite pixel where calibration is to be defined by the "pixel physical calibration table". To be used only when ranges are used to describe the portion of the composite pixel. Required if Pixel Component Organization = Ranges.
>Pixel Component Physical Units	(0018,604C)	1C	The physical units to be applied to the pixel component. Required if Pixel Component Organization exists.
>Pixel Component Data Type	(0018,604E)	1C	The type of data for the pixel component. Required if Pixel Component Organization exists.
>Number of Table Break Points	(0018,6050)	1C	The number of break point coordinate pairs used to describe a piece wise linear curve. Required if Pixel Component Organization equals 0 or 1. Otherwise not used.
>Table of X Break Points	(0018,6052)	1C	An array of X values used to create the piece wise linear curve. Required if Pixel Component Organization equals 0 or 1. Otherwise not used.
>Table of Y Break Points	(0018,6054)	1C	An array of Y values used to create the piece wise linear curve. Required if Pixel Component Organization equals 0 or 1. Otherwise not used.
>Number of Table Entries	(0018,6056)	1C	The number of entries in the Table of Pixel Values. Required if the value of Pixel Component Organization (0018,6044)

			is 2 or 3. Otherwise not used.
>Table of Pixel Values	(0018,6058)	1C	A table of Pixel Values used in conjunction with the Table of Parameter Values (0018,605A) or Pixel Value Mapping Code Sequence (0040,9098) to provide a mapping from Pixel Value to a real world value. Required if the Pixel Component Organization equals 2. Otherwise not used.
>Table of Parameter Values	(0018,605A)	1C	A table of Parameter Values used in conjunction with the Table of Pixel Values (0018,6058) to provide a mapping from Pixel Value to Parameter Value. Required if the value of Pixel Component Organization (0018,6044) is 2. Otherwise not used
> Pixel Value Mapping Code Sequence	(0040,9098)	1C	Sequence that, in conjunction with the Table of Pixel Values (0018,6058), provides a mapping from a Pixel Value to an associated Coded Concept. One or more Items shall be present; the number of Items shall be equal to the value of Number of Table Entries (0018,6056). Required if the value of Pixel Component Organization (0018,6044) is 3 (Code Sequence look up).
>Tranducer Frequency	(0018,6030)	3	The manufacturer defined description of center frequency of the interrogating ultrasound energy. The units are kilohertz.
>Pulse Repetition Frequency	(0018,6032)	3	The ultrasound pulse repetition frequency, as defined by the manufacturer, used to collect data in the region. The units are in hertz.
>Doppler Correction Angle	(0018,6034)	3	The Doppler correction angle. The units are degrees.
>Steering Angle	(0018,6036)	3	The steering angle, as defined by the manufacturer, used for a steered 2D image. The units are degrees.
>Doppler Sample Volume X	(0018,6039)	3	The x displacement, in pixels, from the

Position			Reference pixel to the center of the Doppler sample volume.
>Doppler Sample Volume Y Position	(0018,603B)	3	The y displacement, in pixels, from the Reference pixel to the center of the Doppler sample volume.
>TM-Line Position x_0	(0018,603D)	3	The starting and ending coordinates pairs of the m-line. Where the X_0,Y_0 are the starting point and X_1,Y_1 are the end point of the tm-line.
>TM-Line Position y_0	(0018,603F)	3	The starting and ending coordinates pairs of the m-line. Where the X_0,Y_0 are the starting point and X_1,Y_1 are the end point of the tm-line.
>TM-Line Position x_1	(0018,6041)	3	The starting and ending coordinates pairs of the m-line. Where the X_0,Y_0 are the starting point and X_1,Y_1 are the end point of the tm-line.
>TM-Line Position y_1	(0018,6043)	3	The starting and ending coordinates pairs of the m-line. Where the X_0,Y_0 are the starting point and X_1,Y_1 are the end point of the tm-line..

4.4.1.6.5 US IMAGE Module

The following table specifies the Attributes that describe ultrasound images.

Table 56: US IMAGE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Samples Per Pixel	(0028,0002)	1	Number of samples (planes) in this image.
Photometric Interpretation	(0028,0004)	1	Specifies the intended interpretation of the pixel data.
Bits Allocated	(0028,0100)	1	Number of bits allocated for each pixel sample.
Bits Stored	(0028,0101)	1	Number of bits stored for each pixel sample.
High Bit	(0028,0102)	1	Most significant bit for pixel sample data.
Planar Configuration	(0028,0006)	1C	Indicates whether the pixel data are

			sent color-by-plane or color-by-pixel. Required if Samples per Pixel (0028,0002) has a value greater than 1.
Pixel Representation	(0028,0103)	1	Data representation of pixel samples.
Frame Increment Pointer	(0028,0009)	1C	Contains the Data Element Tag of the attribute which is used as the frame increment in Multi-frame pixel data. Required if Number of Frames is sent.
Image Type	(0008,0008)	2	Image identification characteristics.
Lossy Image Compression	(0028,2110)	1C	Specifies whether an Image has undergone lossy compression. Enumerated Values: 00 = Image has NOT been subjected to lossy compression. 01 = Image has been subjected to lossy compression.
Number of Stages	(0008,2124)	2C	Number of Stages in this protocol. Required if image was acquired in a Staged protocol.
Number of Views in Stage	(0008,212A)	2C	Number of views in this Stage. Required if image was acquired in a Staged protocol.
R Wave Time Vector	(0018,6060)	3	The time offset(s) of the reported R Wave peaks, each relative to the time of the start of the acquisition of the first frame in msec. Multi-valued, with one value per reported R Wave.
Ultrasound Color Data Present	(0028,0014)	3	This element indicates if any ultrasound color data is present in an image. Enumerated Values: 00 = Ultrasound color data not present in image 01 = Ultrasound color data is present in image.
Stage Name	(0008,2120)	3	A Stage is a particular time slice of a protocol in which a set of images are collected. The names can be free form text. Recommended text for Stress Echo stage names are: PRE-EXERCISE, POST-EXERCISE, PEAK-EXERCISE,

			RECOVERY, BASELINE, LOW DOSE, PEAK DOSE
Stage Code Sequence	(0040,000A)	3	Sequence of items describing the performed Ultrasound Protocol Stage(s). One or more Items may be included in this Sequence.
Stage Number	(0008,2122)	3	A number that identifies the Stage. Stage Number starts at one.
View Name	(0008,2127)	3	A View is a particular combination of the position and orientation when a set of images are acquired. Images are acquired at the same View in different Stages for the purpose of comparison.
View Number	(0008,2128)	3	A number that identifies the View. View Number starts at one.
Number of Event Timers	(0008,2129)	3	The number of event timers used at the time of acquisition of a Multi-frame image.
Event Elapsed Time(s)	(0008,2130)	3	An array of values associated with each event timer. Units in milliseconds.
Event Timer Name(s)	(0008,2132)	3	Name that identifies the event timer.
View Code Sequence	(0054,0220)	3	Sequence that describes the view of the patient anatomy in this image. Only a single Item shall be permitted in this Sequence.
>View Modifier Code Sequence	(0054,0222)	3	Sequence that provides modifiers for the view of the patient anatomy. Zero or more Items shall be permitted in this Sequence.
Acquisition DateTime	(0008,002A)	1C	The date and time that the acquisition of data that resulted in this image started. Required if Modality (0008,0060) = IVUS May be present otherwise. Note: The synchronization of this time with an external clock is specified in the Synchronization Module in Acquisition Time Synchronized (0018,1800).
Trigger Time	(0018,1060)	3	Time interval measured in msec from the start of the R-wave to the beginning of data taking

Nominal Interval	(0018,1062)	3	Average R-R interval used for these data, in msec
Beat Rejection Flag	(0018,1080)	3	Beat length sorting has been applied. Enumerated Values: Y = yes N = no
Low R-R Value	(0018,1081)	3	R-R interval low limit for beat rejection, in msec
High R-R Value	(0018,1082)	3	R-R interval high limit for beat rejection, in msec
Heart Rate	(0018,1088)	3	Beats per minute.
IVUS Acquisition	(0018,3100)	1C	Defined Terms: MOTOR_PULLBACK MANUAL_PULLBACK SELECTIVE GATED_PULLBACK
IVUS Pullback Rate	(0018,3101)	1C	Required if IVUS Acquisition (0018,3100) value is MOTOR_PULLBACK. Specified in units of mm/sec.
IVUS Gated Rate	(0018,3102)	1C	Required if IVUS Acquisition (0018,3100) value is GATED_PULLBACK. Specified in units of mm/beat.
IVUS Pullback Start Frame Number	(0018,3103)	1C	Required if IVUS Acquisition (0018,3100) value is MOTOR_PULLBACK or GATED_PULLBACK.
IVUS Pullback Stop Frame Number	(0018,3104)	1C	Required if IVUS Acquisition (0018,3100) value is MOTOR_PULLBACK or GATED_PULLBACK.
Lesion Number	(0018,3105)	3	Identifier(s) of the lesion(s) of interest imaged within the current SOP Instance. Each lesion shall have a unique numeric integer identifier within the study.
Output Power	(0018,5000)	3	Manufacturer defined character string description of ultrasound output level(s) used in generating a given image. Data may be expressed in dB, %, W/cm^2, etc.
Transducer Data	(0018,5010)	3	Manufacturer defined code or

			description of ultrasound transducer used.
Transducer Type	(0018,6031)	3	Defined Terms: SECTOR_PHASED SECTOR_MECH SECTOR_ANNULAR LINEAR CURVED LINEAR SINGLE CRYSTAL SPLIT XTAL CWD IV_PHASED IV_ROT XTAL IV_ROT MIRROR ENDOCAV_PA ENDOCAV_MECH ENDOCAV_CLA ENDOCAV_AA ENDOCAV_LINEAR VECTOR_PHASED
Focus Depth	(0018,5012)	3	The depth, from the transducer face, of the manufacturer defined beam focus used for the image, in cm.
Processing Function	(0018,5020)	3	Manufacturer defined description of processing of echo information. Data may include code or description of gain (initial, overall, TGC, dynamic range, etc.), preprocessing, postprocessing, Doppler processing parameters, e.g. cutoff filters, etc., as used in generating a given image.
Mechanical Index	(0018,5022)	3	
Bone Thermal Index	(0018,5024)	3	
Cranial Thermal Index	(0018,5026)	3	
Soft Tissue Thermal Index	(0018,5027)	3	
Soft Tissue-focus Thermal Index	(0018,5028)	3	
Soft Tissue-surface Thermal Index	(0018,5029)	3	
Depth of Scan Field	(0018,5050)	3	The depth, in mm, from the transducer face to the deepest point included in the displayed image– the field of view.
Overlay Subtype	(60xx,0045)	3	Defined term which identifies the intended purpose of the ROI Overlay Type

4.4.1.6.6 OVERAY

4.4.1.6.6.1 OVERAY PLANE MODULE

The table in below contains Attributes that describe characteristics of an Overlay Plane.

An Overlay Plane describes graphics or bit-mapped text that is associated with an Image. It may also describe a Region of Interest in an Image.

Each Overlay Plane is one bit deep. Sixteen separate Overlay Planes may be associated with an Image. Overlay data is stored in Overlay Data (60xx,3000) . See the Section Repeating Groups in PS 3.5 for a description of permitted values of 60xx.

Attributes describing display of grayscale and color overlays were defined in a previous version of the DICOM Standard. These have now been retired. How an Overlay Plane is rendered is undefined; specifically there is no mechanism to specify with what color or intensity an Overlay Plane is to be displayed, except when rendered under the control of a Grayscale Softcopy Presentation State SOP Instance.

Table 57: OVERLAY PLANE MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Overlay Rows	(60xx,0010)	1	Number of Rows in Overlay.
Overlay Columns	(60xx,0011)	1	Number of Columns in Overlay.
Overlay Type	(60xx,0040)	1	Indicates whether this overlay represents a region of interest or other graphics. Enumerated Values: G = Graphics R = ROI.
Overlay Origin	(60xx,0050)	1	Location of first overlay point with respect to pixels in the image, given as row\column. The upper left pixel of the image has the coordinate 1\1. Column values greater than 1 indicate the overlay plane origin is to the right of the image origin. Row values greater than 1 indicate the overlay plane origin is below the

			image origin. Values less than 1 indicate the overlay plane origin is above or to the left of the image origin.
Overlay Bits Allocated	(60xx,0100)	1	Number of Bits Allocated in the Overlay. Tthe value of this Attribute shall be 1.
Overlay Bit Position	(60xx,0102)	1	The value of this Attribute shall be 0.
Overlay Data	(60xx,3000)	1	Overlay pixel data. The order of pixels sent for each overlay is left to right, top to bottom, i.e., the upper left pixel is sent first followed by the remainder of the first row , followed by the first pixel of the 2nd row, then the remainder of the 2nd row and so on. Overlay data shall be contained in this Attribute ..
Overlay Description	(60xx,0022)	3	User-defined comments about the overlay.
Overlay Subtype	(60xx,0045)	3	Defined term which identifies the intended purpose of the Overlay Type
Overlay Label	(60xx,1500)	3	A user defined text string which may be used to label or name this overlay.
ROI Area	(60xx,1301)	3	Number of pixels in ROI area.
ROI Mean	(60xx,1302)	3	ROI Mean..
ROI Standard Deviation	(60xx,1303)	3	ROI standard deviation..

4.4.1.6.7 VOI LUT

The table in below specifies the Attributes that describe the VOI LUT.

Table 58: VOI LUT MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Include VOI LUT Macro Table 64			

Table 59: VOI LUT MACRO ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
VOI LUT Sequence	(0028,3010)	1C	Defines a sequence of VOI LUTs. One or more Items shall be present.

			Required if Window Center (0028,1050) is not present. May be present otherwise.
>LUT Descriptor	(0028,3002)	1	Specifies the format of the LUT Data in this Sequence.
>LUT Explanation	(0028,3003)	3	Free form text explanation of the meaning of the LUT.
>LUT Data	(0028,3006)	1	LUT Data in this Sequence.
Window Center	(0028,1050)	1C	Window Center for display. Required if VOI LUT Sequence (0028,3010) is not present. May be present otherwise.
Window Width	(0028,1051)	1C	Window Width for display. Required if Window Center (0028,1050) is sent.
Window Center & Width Explanation	(0028,1055)	3	Free form explanation of the meaning of the Window Center and Width. Multiple values correspond to multiple Window Center and Width values.
VOI LUT Function	(0028,1056)	3	Describes a VOI LUT function to apply to the values of Window Center (0028,1050) and Window Width (0028,1051).. Defined terms: LINEAR SIGMOID When this attribute is not present, the interpretation of the values of Window Center (0028,1050) and Window Width (0028,1051) is linear

4.4.1.6.8 SOP COMMON MODULE

The following table defines the Attributes which are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the Real-World Object represented by the IOD.

Table 60: SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
SOP Class UID	(0008,0016)	1	Uniquely identifies the SOP Class. See PS 3.4.
SOP Instance UID	(0008,0018)	1	Uniquely identifies the SOP Instance. See PS 3.4.

Specific Character Set	(0008,0005)	1C	Character Set that expands or replaces the Basic Graphic Set. Required if an expanded or replacement character set is used.
Instance Creation Date	(0008,0012)	3	Date the SOP Instance was created.
Instance Creation Time	(0008,0013)	3	Time the SOP Instance was created.
Instance Creator UID	(0008,0014)	3	Uniquely identifies device which created the SOP Instance.
Related General SOP Class UID	(0008,001A)	3	Uniquely identifies a Related General SOP Class for the SOP Class of this Instance. See PS 3.4.
Original Specialized SOP Class UID	(0008,001B)	3	The SOP Class in which the Instance was originally encoded, but which has been replaced during a fall-back conversion to the current Related General SOP Class. See PS 3.4.
Coding Scheme Identification Sequence	(0008,0110)	3	Sequence of items that map values of Coding Scheme Designator (0008,0102) to an external coding system registration, or to a private or local coding scheme. One or more items may be present in the sequence.
>Coding Scheme Designator	(0008,0102)	1	The value of a Coding Scheme Designator, used in this SOP Instance, which is being mapped.
>Coding Scheme Registry	(0008,0112)	1C	The name of the external registry where further definition of the identified coding scheme may be obtained. Required if coding scheme is registered. Defined term: HL7
>Coding Scheme UID	(0008,010C)	1C	The coding scheme UID identifier. Required if coding scheme is identified by an ISO 8824 object identifier compatible with the UI VR.
>Coding Scheme External ID	(0008,0114)	2C	The coding scheme identifier as defined in an external registry. Required if coding scheme is registered and Coding Scheme UID (0008,010C) is not present.
>Coding Scheme Name	(0008,0115)	3	The coding scheme full common name
>Coding Scheme Version	(0008,0103)	3	The coding scheme version associated with the Coding Scheme Designator (0008,0102).

>Coding Scheme Responsible Organization	(0008,0116)	3	Name of the organization responsible for the Coding Scheme. May include organizational contact information.
Timezone Offset From UTC	(0008,0201)	3	Contains the offset from UTC to the timezone for all DA and TM Attributes present in this SOP Instance, and for all DT Attributes present in this SOP Instance that do not contain an explicitly encoded timezone offset. Encoded as an ASCII string in the format “&ZZXX”. The components of this string, from left to right, are & = “+” or “-”, and ZZ = Hours and XX = Minutes of offset. Leading space characters shall not be present. The offset for UTC shall be +0000; -0000 shall not be used. The local timezone offset is undefined if this Attribute is absent.
Contributing Equipment Sequence	(0018,A001)	3	Sequence of Items containing descriptive attributes of related equipment which has contributed to the acquisition, creation or modification of the composite instance. One or more Items may be included in this Sequence.
>Purpose of Reference Code Sequence	(0040,A170)	1	Describes the purpose for which the related equipment is being reference. Only a single Item shall be permitted in this sequence.
>Manufacturer	(0008,0070)	1	Manufacturer of the equipment that contributed to the composite instance.
>Institution Name	(0008,0080)	3	Institution where the equipment that contributed to the composite instance is located.
>Institution Address	(0008,0081)	3	Address of the institution where the equipment that contributed to the composite instance is located.
>Station Name	(0008,1010)	3	User defined name identifying the machine that contributed to the composite instance.
>Institutional Department Name	(0008,1040)	3	Department in the institution where the equipment that contributed to the composite instance is located.
>Manufacturer’s Model Name	(0008,1090)	3	Manufacturer’s model name of the

			equipment that contributed to the composite instance.
>Device Serial Number	(0018,1000)	3	Manufacturer's serial number of the equipment that contributed to the composite instance.
>Software Versions	(0018,1020)	3	Manufacturer's designation of the software version of the equipment that contributed to the composite instance.
>Spatial Resolution	(0018,1050)	3	The inherent limiting resolution in mm of the acquisition equipment for high contrast objects for the data gathering and reconstruction technique chosen. If variable across the images of the series, the value at the image center.
>Date of Last Calibration	(0018,1200)	3	Date when the image acquisition device calibration was last changed in any way. Multiple entries may be used for additional calibrations at other times.
>Time of Last Calibration	(0018,1201)	3	Time when the image acquisition device calibration was last changed in any way. Multiple entries may be used.
>Contribution DateTime	(0018,A002)	3	The Date & Time when the equipment contributed to the composite instance.
>Contribution Description	(0018,A003)	3	Description of the contribution the equipment made to the composite instance.
Instance Number	(0020,0013)	3	A number that identifies this Composite object instance.
SOP Instance Status	(0100,0410)	3	A flag that indicates the storage status of the SOP Instance. Not Specified (NS) implies that this SOP Instance has no special storage status, and hence no special actions need be taken. Original (OR) implies that this is the primary SOP instance for the purpose of storage, but that it has not yet been authorized for diagnostic use. Authorized Original (AO) implies that this is the primary SOP instance for the purpose of storage, which has been authorized for diagnostic use. Any copies of an Authorized Original should be given the status of Authorized Copy. Authorized Copy

			(AC) implies that this is a copy of an Authorized Original SOP Instance. Enumerated Values: NS, OR, AO, AC Note: Proper use of these flags is specified in Security Profiles. Implementations that do not conform to such Security Profiles may not necessarily handle these flags properly.
SOP Authorization Date and Time	(0100,0420)	3	The date and time when the SOP Instance Status (0100,0410) was set to AO.
SOP Authorization Comment	(0100,0424)	3	Any comments associated with the setting of the SOP Instance Status (0100,0410) to AO.
Authorization Equipment Certification Number	(0100,0426)	3	The certification number issued to the Application Entity that set the SOP Instance Status (0100,0410) to AO.
Encrypted Attributes Sequence	(0400,0500)	1C	Sequence of Items containing encrypted DICOM data. One or more Items shall be present. Required if application level confidentiality is needed and certain recipients are allowed to decrypt all or portions of the Encrypted Attributes Data Set.
>Encrypted Content Transfer Syntax UID	(0400,0510)	1	Transfer Syntax used to encode the encrypted content. Only Transfer Syntaxes that explicitly include the VR and use Little Endian encoding shall be used.
Original Attributes Sequence	(0400,0561)	3	Sequence of Items containing all attributes that were removed or replaced by other values in the main dataset. One or more Items may be permitted in this sequence.
>Source of Previous Values	(0400,0564)	2	The source that provided the SOP Instance prior to the removal or replacement of the values. For example, this might be the Institution from which imported SOP Instances were received.
>Attribute Modification DateTime	(0400,0562)	1	Date and time the attributes were removed and/or replaced.

>Modifying System	(0400,0563)	1	Identification of the system which removed and/or replaced the attributes.
>Reason for the Attribute Modification	(0400,0565)	1	Reason for the attribute modification. Defined terms are: COERCE = Replace values of attributes such as Patient Name, ID, Accession Number, for example, during import of media from an external institution, or reconciliation against a master patient index. CORRECT = Replace incorrect values, such as Patient Name or ID, for example, when incorrect worklist item was chosen or operator input error.
>Modified Attributes Sequence	(0400,0550)	1	Sequence containing a single item that contains all the Attributes, with their previous values, that were modified or removed from the main data set.
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Sequence of items defining mapping and/or access mechanism for HL7 Structured Documents referenced from the current SOP Instance. One or more Items may be included in this sequence. Required if HL7 Structured Documents are referenced within the Instance.
>Referenced SOP Class UID	(0008,1150)	1	Unique identifier for the class of HL7 Structured Document.
>Referenced SOP Instance UID	(0008,1155)	1	Unique identifier for the HL7 Structured Document as used in DICOM instance references.
>HL7 Instance Identifier	(0040,E001)	1	Instance Identifier of the referenced HL7 Structured Document, encoded as a UID (OID or UUID), concatenated with a caret (“^”) and Extension value (if Extension is present in Instance Identifier).
>Retrieve URI	(0040,E010)	3	Retrieval access path to HL7 Structured Document. Includes fully specified scheme, authority, path, and query in accordance with RFC 2396

5. ULTRASOUND MULTI-FRAME IMAGE INFORMATION OBJECT DEFINITION

5.1 US Image IOD Description

The Ultrasound (US) Multi-frame Image Information Object Definition specifies a Multi-frame image that has been created by an ultrasound imaging device.

5.2 US Multi-Frame Image IOD Entity-Relationship Model

The E-R Model in Section A.1.2 depicts those components of the DICOM Application Information Model that directly reference the US Multi-frame Image IOD. The Overlay IE, Modality LUT IE and VOI LUT IE are not components of the US Multi-frame Image IOD.

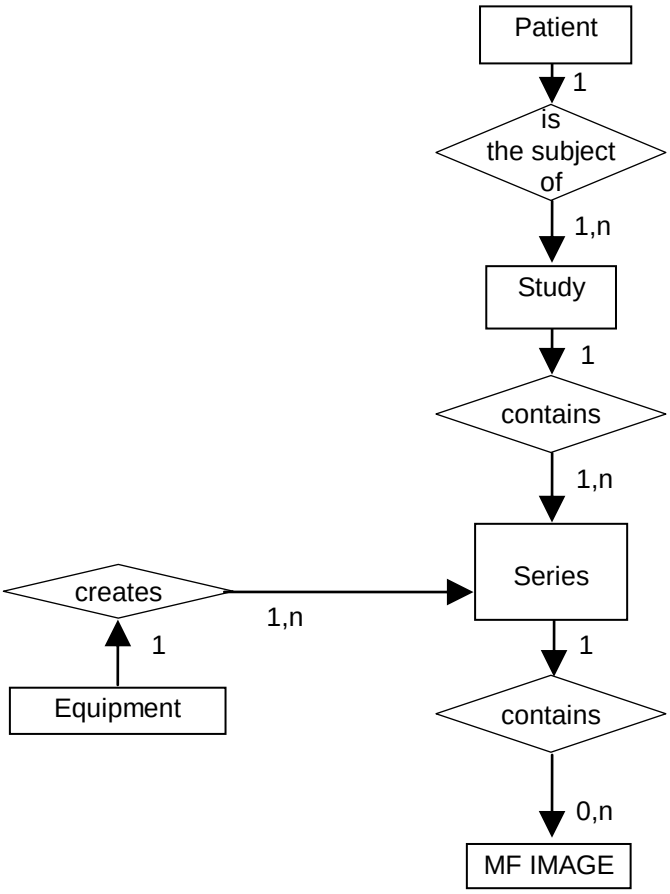

Figure 9: US MF IMAGE ENTITY RELATIONSHIP DIAGRAM

5.3 US Multi-Frame Image IOD Module Table

Section A.7.3 was defined in a previous version of the DICOM Standard. The Section is now retired.

Table A.7-1 US MULTI-FRAME IMAGE IOD MODULES

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
Series	General Series	C.7.3.1	M
Frame of	Frame of Reference	C.7.4.1	U
Equipment	General Equipment	C.7.5.1	M
Image	General Image	C.7.6.1	M
	Image Pixel	C.7.6.3	M
	Contrast/bolus	C.7.6.4	C - Required if contrast media was used in this image.
	Cine	C.7.6.5	M
	Multi-frame	C.7.6.6	M
	Frame Pointers	C.7.6.9	U
	Palette Color Lookup Table	C.7.9	C - Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR
	US Region Calibration	C.8.5.5	U
	US Image	C.8.5.6	M
	VOI LUT	C.11.2	U
	SOP Common	C.12.1	M

The following table specifies the Attributes of a Multi-frame pixel data Image.

Table 61: MULTI-FRAME MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
Number of Frames	(0028,0008)	1	Number of frames in a Multi-frame Image.
Frame Increment Pointer	(0028,0009)	1	Contains the Data Element Tag of the attribute that is used as the frame increment in Multi-frame pixel data

6. Appendix A : OB-GYN Structured Report Measurements

OB-GYN Standard Report of ECUBE 5 is implemented with reference to the DICOM Part 3, DICOM Part 16, DICOM Supplement 26. The following items are included in OB-GYN Structured Report of ECUBE 5. And we described private tag to "ALPINON2011".

6.1 DICOM SR IOD

The DICOM SR File includes attribute as below.

Module	Attribute	Tag	Notes
Patient	Patient's Name	(0010,0010)	Last Name, First & Middle fields. Populated from Modality Worklist if used.
	Patient ID	(0010,0020)	ID field. Default is today's date & time (e.g., 03_04_2003_17_54_43 = Apr. 3, 2003 at 5:54:43 PM). Populated from Modality Worklist if used.
	Patient's Birth Date	(0010,0030)	DOB field. Default is a zero length attribute. Populated from Modality Worklist if used.
	Patient's Sex	(0010,0040)	Gender field. M = male F = female. O = Other Default is a zero length attribute. Populated from Modality Worklist if used.
General Study	Study Instance UID	(0020,000D)	Populated from Modality Worklist if used;
	Study Date	(0008,0020)	Date the exam started.
	Study Time	(0008,0030)	Time the exam started.
	Referring Physician's Name	(0008,0090)	Physician field. Populated from Modality Worklist if used.
	Study ID	(0020,0010)	Generated
	Accession Number	(0008,0050)	Accession # field. Populated from Modality Worklist if used.
SR Document Series	Modality	(0008,0060)	Always set to "SR"
	Series Instance UID	(0020,000E)	Generated
	Series Number	(0020,0011)	Series Number in study (2-n).
General Equipment	Manufacturer	(0008,0070)	Set to "ALPINION MEDICAL SYSTEMS"

SR Document General SOP Common	Content Date	(0008,0023)	Date the report was created
	Content Time	(0008,0033)	Time the report was created
	Instance Number	(0020,0013)	Always set to 1.
	SOP Class UID	(0008,0016)	1.2.840.10008.5.1.4.1.1.88.33
	SOP Instance UID	(0008,0018)	Generated
	Instance Creation Date	(0008,0012)	Date the SOP Instance was created.
	Instance Creation Time	(0008,0013)	Time the SOP Instance was created.
	Instance Creator UID	(0008,0014)	

6.2. TID 5000 : OB-GYN Ultrasound Procedure Report

Label	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning (0008,0104)	Modifiers
OB-GYN Ultrasound Procedure Report	DCM	125000	OB-GYN Ultrasound Procedure Report	

Table 62: OB-GYN Ultrasound Procedure Report

6.3. TID 5001 : Patient Characteristics

Label	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning (0008,0104)	Modifiers
Patient Characteristics	DCM	121118	Patient Characteristics	
Height	LN	8302-2	Patient Height	
Weight	LN	29463-7	Patient Weight	
Gravida	LN	11996-6	Gravida	
Para	LN	11977-6	Para	
Aborta	LN	11612-9	Aborta	
Ectopic	LN	33065-4	Ectopic Pregnancies	

Table 63: Patient Characteristics

6.4. TID 5002 : OB-GYN Summary

Label	Coding Scheme	Code Value	Code Meaning	Modifiers

	Designator (0008, 0102)	(0008, 0100)	(0008, 0104)	
OB-GYN Summary	DCM	121111	Summary	
LMP	LN	11955-2	LMP	

Table 64: OB-GYN Summary

6.5. TID 5003 : Fetus Summary

Label	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning (0008, 0104)	Modifiers
Fetus Summary	DCM	125008	Fetus Summary	
EFW	LN	11727-5	Estimated Weight	
EFW GP	LN	11767-1	EFW percentile rank	
AUA	LN	11884-4	Average Ultrasound Age	
CUA	LN	11888-5	Composite Ultrasound Age	

Table 65: Fetus Summary

6.5.1. EFW Authors

Label	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning (0008, 0104)	Modifiers
Hadlock (AC,FL)	LN	11751-5	EFW by AC, FL, Hadlock 1985	
Hadlock (AC,BPD)	LN	11738-2	EFW by AC, BPD, Hadlock 1984	
Hadlock (AC,BPD,FL)	LN	11735-8	EFW by AC, BPD, FL, Hadlock 1985	
Hadlock (AC,FL,HC)	LN	11746-5	EFW by AC, FL, HC, Hadlock 1985	
Hadlock (AC,BPD,FL,HC)	LN	11732-5	EFW by AC, BPD, FL, HC Hadlock 1985	
Campbell	LN	11756-4	EFW by AC, Campbell 1975	
Hansmann	LN	33139-7	EFW by BPD, TTD,	

(BPD,TTD)			Hansmann 1986	
Merz (BPD, AC)	ALPINION2011	EFWMerz	EFW by AC, BPD, Merz	
Osaka (BPD, FTA, FL)	LN	33140-5	EFW by BPD, FTA, FL, Osaka 1990	
Persson	ALPINION2011	EFWPersson	EFW by, BPD, MAD, FL, Persson	
Schild	ALPINION2011	EFWSchild	EFW by HC,AC,FL, Schild	
Shepard	LN	11739-0	EFW by AC and BPD, Shepard 1982	
Shinozuka1	LN	33141-3	EFW1 by Shinozuka 1996	
Shinozuka2	LN	33142-1	EFW2 by Shinozuka 1996	
Shinozuka3	LN	33143-9	EFW3 by Shinozuka 1996	
Tokyo (BPD, APAD, TAD,FL)	LN	33144-7	EFW by BPD, APAD, TAD, FL, Tokyo 1987	

Table 66: EFW Authors

6.5.2. EFW GP Authors

Label	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning (0008, 0104)	Modifiers
Hadlock	LN	33183-5	FWP by GA, Hadlock 1991	
Brenner	LN	33189-2	FWP by GA, Brenner 1976	
Williams	LN	33184-3	FWP by GA, Williams, 1982	

Table 67: EFW GP Authors

6.6. TID 5004 : Fetal Biometry Ratios

Label	Coding Scheme	Code Value	Code Meaning	Modifiers

	Designator (0008, 0102)	(0008, 0100)	(0008, 0104)	
Fetal Biometry Ratios	DCM	125001	Fetal Biometry Ratios	
CI	LN	11823-2	Cephalic Index	
	SRT	R-10041	Normal Range Lower Limit	
	SRT	R-0038B	Normal Range Upper Limit	
CTAR	APINION2011	CTAR	Cardiothoracic Area Ratio	
	APINION2011	CTAR_A1	CTAR, Cardiac Area	
	APINION2011	CTAR_A2	CTAR, Thoracic Area	
FL/BPD	LN	11872-9	FL/BPD	
	SRT	R-10041	Normal Range Lower Limit	
	SRT	R-0038B	Normal Range Upper Limit	
FL/AC	LN	11871-1	FL/AC	
	SRT	R-10041	Normal Range Lower Limit	
	SRT	R-0038B	Normal Range Upper Limit	
FL/HC	LN	11873-7	FL/HC	
	SRT	R-10041	Normal Range Lower Limit	
	SRT	R-0038B	Normal Range Upper Limit	
HC/AC	LN	11947-9	HC/AC	
	SRT	R-10041	Normal Range Lower Limit	
	SRT	R-0038B	Normal Range Upper Limit	

Table 68: Fetal Biometry Ratios

6.7. TID 5005 : Fetal Biometry Measurements

Label	Author	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning (0008, 0104)	Modifiers
Fetal Biometry Measurements		DCM	125002	Fetal Biometry	
AC		LN	11979-2	Abdominal Circumference	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	ASUM	LN	33072-0	AC, ASUM 2000	
		SRT	R-00388	2 Sigma Lower Value of population	
		SRT	R-00387	2 Sigma Upper Value of population	
	CFEF	APINION2011	ACMACFEF	AC, CFEF	
	Chitty	APINION2011	ACMAChitty	AC, Chitty	
	Hadlock 82	APINION2011	ACMAHadlock82	AC, Hadlock82 1990	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Hadlock 84	LN	11892-7	AC, Hadlock 1984	
		SRT,	R-00388	2 Sigma Lower Value of population	
		SRT	R-00387	2 Sigma Upper Value of population	
	Hansmann	LN	33073-8	AC, Hansmann1985	
	Jeanty	LN	11893-5	AC, Jeanty 1984	
	JSUM	APINION2011	ACMAJSUM	AC, JSUM	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Kurmanavicius	APINION2011	ACMAKurmanavicius	AC, Kurmanavicius	
	Merz	LN	33075-3	AC, Mertz 1988	
		SRT	R-00397	5th Percentile Value of	

				population	
		SRT	R-00337	95th Percentile Value of population	
	Nicolaides	APINION2011	ACMANicolaides	AC, Nicolaides	
	Shinozuka	LN	33076-1	AC, Shinozuka 1996	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Tokyo	APINION2011	ACMAToky o	AC, Tokyo	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
HC		LN	11984-2	Head Circumference	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	ASUM	LN	33109-0	HC, ASUM 2000	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	CFEF	APINION2011	HCMACFEF	HC, CFEF	
	Chitty	LN	33110-8	HC measured, Chitty 1997	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Hadlock 82	APINION2011	HCMAHadlock82	HC, Hadlock82 1990	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Hadlock 84	LN	11932-1	HC, Hadlock 1984	
		SRT	R-00388	2 Sigma Lower Value of population	
		SRT	R-00387	2 Sigma Upper Value of	

				population	
	Hansmann	LN	33543-0	HC, Hansmann 1986	
	Jeanty	LN	11934-7	HC, Jeanty 1984	
	Johnsen	APINION2011	HCMAJohnsen	HC, Johnsen	
		SRT	R-00377	10th Percentile Value of population	
		SRT	R-00338	90th Percentile Value of population	
	Kurmanavicius	APINION2011	HCMAKurmanavicius	HC, Kurmanavicius	
	Merz	LN	33115-7	HC, Merz 1988	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Nicolaides	APINION2011	HCMANicolaides	HC, Nicolaides	
OFD(HC)		APINION2011	OFDHC	OFD(HC)	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
BPD		LN	11820-8	Biparietal Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	ASUM	LN	33079-5	BPD, ASUM 1989	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	CFEF	APINION2011	BPDMACFEF	BPD CFEF	
	Hadlock 82	LN	11901-6	BPDa, Hadlock 1982	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Hadlock 84	LN	11902-4	BPD, Hadlock 1984	
		SRT,	R-00387	2 Sigma Upper Value of	

				population	
		SRT	R-00388	2 Sigma Lower Value of population	
	Hansmann	LN	33538-0	BPD, Hansmann 1986	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Jeanty	LN	11905-7	BPD, Jeanty 1984	
	Johnsen	APINION2011	BPDMAJohnsen	BPD Johnsen	
		SRT	R-00377	10th Percentile Value of population	
		SRT	R-00338	90th Percentile Value of population	
	JSUM	ALPINION2011	BPDMAJSUM	BPD JSUM	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Kurtz	LN	11906-5	BPD, Kurtz 1980	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Kurmanavicius	ALPINION2011	BPDMAKurmanavicius	BPD Kurmanavicius	
	Marsal	ALPINION2011	BPDMAMarsal	BPD Marsal	
	Merz	LN	33081-1	BPD, Mertz 1988	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Nicolaides	APINION2011	BPDMANicolaides	BPD Nicolaides	
	Osaka	LN	33082-9	BPD, Osaka 1989	
	Sabbanha	LN	11907-3	BPD, Sabbagha 1978	

		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Shinozuka	LN	33084-5	BPD, Shinozuka 1996	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Tokyo	LN	33085-2	BPD, Tokyo 1986	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
OFD		LN	11851-3	Occipital-Frontal Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	ASUM	LN	33119-9	OFD, ASUM 2000	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Hansmann	LN	33120-7	OFD, Hansmann 1986	
	Jeanty	ALPINION2011	OFDMAJeanty	OFD, Jeanty	
	Kurmanavicius	ALPINION2011	OFDMAKurmanavicius	OFD, Kurmanavicius	
	Merz	ALPINION2011	OFDMAMerz	OFD, Merz	
	Nicolaides	ALPINION2011	OFDMANicolaides	OFD, Nicolaides	
MAD		ALPINION2011	MAD	Middle Abdominal Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	EIK-NES	ALPINION2011	MADMAEIKNES	MAD, EIK-NES	
	Kurmanavicius	ALPINION2011	MADMAKurmanaviciu s	MAD, Kurmanavicius	
FTA		LN	33068-8	Thoracic Area	Maximum(SRT, G-A437)
	Osaka	ALPINION2011	FTAMAOsa	FTA, Osaka	

			ka		Minimum(SRT, R-404FB) Mean(SRT, R-00317)
TAD		LN	11862-0	Tranverse Abdominal Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	CFEF	ALPINION2011	TADMACFEF	TAD CFEF	
	Merz	ALPINION2011	TADMAMerz	TAD Merz	
TTD		LN	11864-6	Transverse Thoracic Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Hansmann	LN	33136-3	Transverse Thoracic Diameter, Hansmann 1985	
TC		LN	11988-3	Thoracic Circumference	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
APTD		LN	11819-0	Anterior-Posterior Trunk Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Hansmann	ALPINION2011	APTDMAHansmann	APTD Hansmann	
TCD		LN	11863-8	Trans Cerebellar Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Chitty	LN	33132-2	TCD, Chitty 1994	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Hill	LN	33134-8	TCD, Hill 1990	
		SRT	R-00346	1 Sigma Upper Value of population	
		SRT	R-00347	1 Sigma Lower Value of	

				population	
	Nicolaides	ALPINION2011	TCDMANicolaides	TCD Nicolaides	
APAD		LN	11818-2	Anterior-Posterior Abdominal Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
EL		ALPINION2011	EarDist	Ear Length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
Scapular		ALPINION2011	ScapularDimension	Scapular Dimension	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
FB		ALPINION2011	FetalBowel	Fetal Bowel Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
Foot		LN	11965-1	Foot length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
FK		LN	11834-9	Left Kidney length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		LN	11836-4	Right Kidney length	

HA		ALPINION2011	HeartArea	Heart Area	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
LL		ALPINION2011	LiverDist	Liver Length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
RL		ALPINION2011	RibDist	Rib Length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
SC		ALPINION2011	SplenicCircumference	Splenic Circumference	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
AD		ALPINION2011	Abdominal Diameter	Abdominal Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
AA		ALPINION2011	Abdominal Area	Abdominal Area	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
APTD&TTD(APTD)		ALPINION2011	APTDnTTD_APTD	APTDnTTD, APTD	Maximum(SRT, G-A437) Minimum(SRT
APTD&TTD(TT		ALPINION2011	APTDnTTD	APTDnTTD, TTD	

D)			_TTD		, R-404FB) Mean(SRT, R-00317)
AxT(APTD)		ALPINION2011	AxT_APTD	AxT, APTD	
AxT(TTD)		ALPINION2011	AxT_TTD	AxT, TTD	
AxT		ALPINION2011	APTD_TTD	APTD * TTD	
	Shinozuka	LN	33078-7	AxT, Shinozuka 1996	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Tokyo	ALPINION2011	AXTMATokyo	AXT, Tokyo	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	

Table 69: Fetal Biometry Measurements

6.8. TID 5006 : Fetal Long Bones

Label	Author	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning (0008, 0104)	Modifiers
Fetal Long Bones		DCM	125003	Fetal Long Bones	
CLAV		LN	11962-8	Clavicle length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Yarkoni	LN	33088-6	Clavicle length, Yarkoni 1985	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
HL		LN	11966-9	Humerus length	Maximum(SRT, G-A437) Minimum(SRT,
	ASUM	LN	33116-5	Humerus Length, ASUM 2000	

		SRT	R-00347	1 Sigma Lower Value of population	R-404FB) Mean(SRT, R-00317)
		SRT	R-00346	1 Sigma Upper Value of population	
	Jeanty	LN	11936-2	Humerus, Jeanty 1984	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Merz	LN	11937-0	Humerus, Merz 1987	
	Osaka	LN	33117-3	Humerus Length, Osaka 1989	
FL		LN	11963-6	Femur Length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	ASUM	APINION2011	FLMAASUM	FL, ASUM	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	CFEF	APINION2011	FLMACFEF	FL, CFEF	
	Chitty	LN	33098-5	FL, Chitty 1997	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Hadlock 82	APINION2011	FLMAHadlock82	FL, Hadlock82 1990	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Hadlock 84	LN	11920-6	FL, Hadlock 1984	
		SRT	R-00388	2 Sigma Lower Value of population	
		SRT	R-00387	2 Sigma Upper Value of population	
	Hansmann	LN	33541-4	FL, Hansmann 1986	
	Hohler	LN	11922-2	FL, Hohler 1982	
		SRT	R-00388	2 Sigma Lower Value of population	

		SRT	R-00387	2 Sigma Upper Value of population	
	Jeanty	LN	11923-0	FL, Jeanty 1984	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	JSUM	ALPINION2011	FLMAJSUM	FL, JSUM	
		SRT	R-00346	1 Sigma Upper Value of population	
		SRT	R-00347	1 Sigma Lower Value of population	
	Kurmanavicius	ALPINION2011	FLMAKurmanavicius	FL, Kurmanavicius	
	Marsal	ALPINION2011	FLMAMarsal	FL, Marsal	
	Merz	LN	33542-2	FL, Merz 1988	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Nicolaides	APINION2011	FLMANicolaides	FL, Nicolaides	
	Obrien	APINION2011	FLMAOBrien	FL, OBrien	
	Osaka	LN	33101-7	FL, Osaka 1989	
	Shinozuka	LN	33102-5	FL, Shinozuka 1996	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Tokyo	LN	33103-3	FL, Tokyo 1986	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Warda	APINION2011	FLMAWarda	FL, Warda	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
RAD		LN	11967-7	Radius length	Maximum(SRT, G-A437)
	Merz	LN	11939-6	Radius, Merz 1987	

					Minimum(SRT, R-404FB) Mean(SRT, R-00317)
ULNA		LN	11969-3	Ulna length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Jeanty	LN	11944-6	Ulna, Jeanty 1984	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Merz	LN	11945-3	Ulna, Merz 1987	
TIB		LN	11968-5	Tibia length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Jeanty	LN	11941-2	Tibia, Jeanty 1984	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Merz	ALPINION2011	TIBMerz	TIB, Merz	
FIB		LN	11964-4	Fibula length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Jeanty	LN	33164-5	Fibula by GA, Jeanty 1983	
NB		ALPINION2011	NasalBoneDist	Nasal bone Length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)

Table 70: Fetal Long Bones

6.9. TID 5007 : Fetal Cranium

Label	Author	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning (0008, 0104)	Modifiers

Fetal Cranium		DCM	125004	Fetal Cranium	
OOD		LN	11629-3	Outer Orbital Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
CM		LN	11860-4	Cisterna Magna	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)

Table 71: Fetal Cranium

6.10. TID 5010 : Amniotic Sac

Label	Sub Item	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning (0008, 0104)	Modifiers
Amniotic Sac		SRT	T-F1300	Amniotic Sac	
AFI	AFI1	LN	11624-4	First Quadrant Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	AFI2	LN	11626-9	Second Quadrant Diameter	
	AFI3	LN	11625-1	Third Quadrant Diameter	
	AFI4	LN	11623-6	Fourth Quadrant Diameter	
	AFI Sum	LN	11627-7	Amniotic Fluid Index	

Table 72: Amniotic Sac

6.11. TID 5011 : Early Gestation

Label	Author	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning (0008, 0104)	Modifiers

Early Gestation		DCM	125009	Early Gestation	
CRL		LN	11957-8	Crown Rump Length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	ASUM	LN	33090-2	CRL, ASUM 2000	
	Daya	LN	33091-0	CRL, Daya 1993	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Hadlock	LN	11910-7	CRL, Hadlock 1992	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Hansmann	LN	33540-6	CRL, Hansmann 1986	
		SRT	R-00388	2 Sigma Lower Value of population	
		SRT	R-00387	2 Sigma Upper Value of population	
	JSUM	ALPINION2011	CRLMAJSUM	CRL, JSUM 2001	
		SRT	R-00337	10th Percentile Value of population	
		SRT	R-00338	90th Percentile Value of population	
	Marsal	ALPINION2011	CRLMAMarsal	CRL, Marsal	
	Nelson	LN	11913-1	CRL, Nelson 1981	
	Osaka	LN	33093-6	CRL, Osaka 1989	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Rempen	LN	33094-4	CRL, Rempen 1991	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	
	Robinson	LN	11914-9	CRL, Robinson 1975	
		SRT	R-00388	2 Sigma Lower Value of population	

		SRT	R-00387	2 Sigma Upper Value of population	
	Shinozuka	LN	33095-1	CRL, Shinozuka 1996	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
	Tokyo	LN	33096-9	CRL, Tokyo 1986	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
GS		LN	11850-5	Gestational Sac Diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Hansmann	LN	33106-6	GS, Hansmann 1982	
	Hellman	LN	11928-9	GS, Hellman 1969	
	Hollander	ALPINION2011	GSMAHollander	GS, Hollander	
	Rempen	LN	11929-7	GS, Rempen 1991	
		SRT	R-00388	2 Sigma Lower Value of population	
		SRT	R-00387	2 Sigma Upper Value of population	
	Tokyo	LN	33108-2	GS, Tokyo 1986	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
SL		LN	33071-2	Spine Length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Tokyo	LN	33127-2	Spine Length, Tokyo, 1989	
		SRT	R-00347	1 Sigma Lower Value of population	
		SRT	R-00346	1 Sigma Upper Value of population	
YS		LN	11816-6	Yolk Sac length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-

					00317)
NT		LN	33069-6	Nuchal Translucency	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
BOD		ALPINION2011	BOD	Binocular Distance	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Jeanty	ALPINION2011	BODMAJeanty	BOD, Jeanty	
		SRT	R-00397	5th Percentile Value of population	
		SRT	R-00337	95th Percentile Value of population	

Table 73: Early Gestation

6.12. Private Section : Ovaries Section

Label	Sub Item	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning	Modifiers
Ovaries Section		ALPINION2011	Ovaries	Ovaries Section	
OV	Lt OV L	LN	11840-6	Left Ovary Length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Lt OV H	LN	11857-0	Left Ovary Height	
	Lt OV W	LN	11829-9	Left Ovary Width	
	Lt OV LHW	LN	12164-0	Left Ovary Volume	
	Lt OV Volume	ALPINION2011	LeftOvaryVolDist1	Left Ovary Volume: Distance1	
		ALPINION2011	LeftOvaryVolDist2	Left Ovary Volume: Distance2	
		ALPINION2011	LeftOvaryVolDist3	Left Ovary Volume: Distance3	
		LN	12164-0	Left Ovary Volume	
	Rt OV L	LN	11841-4	Right Ovary Length	
	Rt OV H	LN	11858-8	Right Ovary Height	
	Rt OV W	LN	11830-7	Right Ovary Width	

	Rt OV LHW	LN	12165-7	Right Ovary Volume	
	Rt OV Volume	ALPINION2011	RightOvaryVolDist1	Right Ovary Volume: Distance1	
		ALPINION2011	RightOvaryVolDist2	Right Ovary Volume: Distance2	
		ALPINION2011	RightOvaryVolDist3	Right Ovary Volume: Distance3	
		LN	12165-7	Right Ovary Volume	

Table 74: Private Section : Ovaries Section

6.13. Findings Site : Pelvic Vascular Structure

All label have same sub items. And all label have each location information(off, prox, mid, dist) and side information(Lt, Rt). (All Sub Items = PS, ED, MD, SD, DS, PI, RI, TAMAX, Accel, AT)

Label	Sub Item	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning	Modifiers
Pelvic Vascular Structure		SRT	T-D6007	Pelvic Vascular Structure	
	PS	LN	11726-7	Peak Systolic Velocity	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	ED	LN	11653-3	End Diastolic Velocity	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	MD	LN	11665-7	Minimum Diastolic Velocity	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188)

					Distal (SRT G-A119)
	SD	LN	12144-2	Systolic to Diastolic Velocity Ratio	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	DS	LN	20216-8	Deceleration Slope	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	PI	LN	12008-9	Pulsatility Index	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	RI	LN	12023-8	Resistivity Index	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	TAMAX	LN	11692-1	Time averaged peak velocity	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	Accel	LN	20167-3	Acceleration Index	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	AT	LN	20168-1	Acceleration Time	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
Umbilical A	All Sub Items	SRT	T-F1810	Umbilical Artery	
UmbAD		SRT	T-F1810	Umbilical Artery	

				- Vessel lumen diameter (SRT, G-0364)	
UmbVD		SRT	T-F1820	Umbilical Vein - Vessel lumen diameter (SRT, G-0364)	
Uterine A	All Sub Items (include location, side)	SRT	T-46820	Uterine Artery	
Ovarian A	All Sub Items (include location, side)	SRT	T-46980	Ovarian Artery (Laterality)	
Placenta	All Sub Items (include location)	SRT	T-F1412	Vitelline Artery of Placenta	
Ao	All Sub Items (include location)	SRT	T-42000	Aorta	

Table 75: Pelvic Vascular Structure

6.14. Findings Site : Embryonic Vascular Structure

All label have same subitems. And all label have each location information (off, prox, mid, dist) and side information(Lt, Rt). (All Sub Items = PS, ED, MD, SD, DS, PI, RI, TAMAX, Accel, AT)

Label	Sub Item	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning	Modifiers
Embryonic		SRT	T-F6800	Finding Site :	

Vascular Structure				Embryonic Vascular Structure	
	PS	LN	11726-7	Peak Systolic Velocity	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	ED	LN	11653-3	End Diastolic Velocity	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	MD	LN	11665-7	Minimum Diastolic Velocity	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	SD	LN	12144-2	Systolic to Diastolic Velocity Ratio	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	DS	LN	20216-8	Deceleration Slope	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	PI	LN	12008-9	Pulsatility Index	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	RI	LN	12023-8	Resistivity Index	Proximal (SRT G-

					A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	TAMAX	LN	11692-1	Time averaged peak velocity	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	Accel	LN	20167-3	Acceleration Index	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
	AT	LN	20168-1	Acceleration Time	Proximal (SRT G-A118) Mid longitudinal (SRT G-A188) Distal (SRT G-A119)
DesAorta	All Sub Items (include location)	SRT	T-D0765	Descending Aorta	
MCA	All Sub Items	SRT	T-45600	Middle Cerebral Artery	
Ves	All Sub Items (include location, side)	ALPINION2011	Vessel	Vessel	
DV	All Sub Items (include location)	ALPINION2011	DV	Ductus Venosus	
HR (OB)		LN	11948-7	Fetal Heart Rate	

HR (GYN)		LN	8867-4	Heart Rate	

Table 76: Embryonic Vascular Structure

6.15. TID 5009 : Fetal Biophysical Profile Section

Label	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning (0008, 0104)	Modifiers
Biophysical Profile	DCM	125006	Biophysical Profile	
Gross Body Movement	LN	11631-9	Gross Body Movement	
Fetal Breathing	LN	11632-7	Fetal Breathing	
Fetal Tone	LN	11635-0	Fetal Tone	
Fetal Heart Reactivity	LN	11635-5	Fetal Heart Reactivity	
Amniotic Fluid Volume	LN	11630-1	Amniotic Fluid Volume	
Biophysical Profile Sum Score	LN	11634-3	Biophysical Profile Sum Score	

Table 77: Fetal Biophysical Profile Section

6.16. TID 5015 : Pelvis and Uterus (Gynecology Group)

Label	Sub Item	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning	Modifiers
Pelvis and Uterus		DCM	125011	Pelvis and Uterus	
Cervix		LN	11961-0	Cervix Length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)

Endo		LN	12145-9	Endometrium Thickness	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
UT		SRT	T-83000	Uterus	
	UT L	LN	11842-2	Uterus Length	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	UT H	LN	11859-6	Uterus Height	
	UT W	LN	11865-3	Uterus Width	
	UT LHW	LN	33192-6	Uterus Volume	
	UT Volume	ALPINION2011	UterusDistValue	Uterus Distance Volume	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		ALPINION2011	UterusVolDist1	Uterus Volume: Distance1	
		ALPINION2011	UterusVolDist2	Uterus Volume: Distance2	
		ALPINION2011	UterusVolDist3	Uterus Volume: Distance3	
		LN	33192-6	Uterus Volume	
Bladder		ALPINION2011	Bladder	Bladder Section	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Bladder L	ALPINION2011	BladderLength	Bladder Length	
	Bladder H	ALPINION2011	BladderHeight	Bladder Height	
	Bladder W	ALPINION2011	BladderWidth	Bladder Width	
	Bladder LHW	ALPINION2011	BladderVolume	Bladder Volume	
	Bladder Volume	ALPINION2011	BladderDistanceVolume	Bladder Distance Volume	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		ALPINION2011	BladderVolDist1	Bladder Volume: Distance1	
		ALPINION2011	BladderVolDist2	Bladder Volume: Distance2	
		ALPINION2011	BladderVolDist3	Bladder Volume:	

				Distance3	
		ALPINION2011	BladderVolume	Bladder Volume	

Table 78: Pelvis and Uterus

6.17. Private Section : Ovarian Follicle Section (Gynecology Group)

All Follicle label have side(Lt, Rt) information. Each side have same code meaning.

Label	Sub Item	Coding Scheme Designator (0008, 0102)	Code Value (0008, 0100)	Code Meaning	Modifiers
Ovarian Follicle Section		ALPINION2011	Follicles	Ovarian Follicle Section	
Follicle		APINION2011	Follicles	Ovarian Follicle Section	
	Follicle1	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	
	Follicle2	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	
	Follicle3	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	

	Follicle4	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	
	Follicle5	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	
	Follicle6	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	
	Follicle7	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	
	Follicle8	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	
	Follicle9	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437) Minimum(SRT,
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	

					R-404FB) Mean(SRT, R-00317)
	Follicle10	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Follicle11	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Follicle12	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Follicle13	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Follicle14	SRT	G-D705	Volume	
		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	Minimum(SRT, R-404FB) Mean(SRT, R-00317)
	Follicle15	SRT	G-D705	Volume	

		APINION2011	follicle1d	Follicle 1st diameter	Maximum(SRT, G-A437) Minimum(SRT, R-404FB) Mean(SRT, R-00317)
		APINION2011	follicle2d	Follicle 2st diameter	
		APINION2011	follicle3d	Follicle 3st diameter	

Table 79: Ovarian Follicle

7. Appendix B : Conformance Statement Overview

E-CUBE 5 Ultrasound systems implement the necessary DICOM services to download worklists from an information system, save acquired US Images to a network storage device, CD or DVD or removable USB Storage Device, print to a networked hardcopy device and inform the information system about the work actually done.

Table 80 provides an overview of the supported network services.

Networking SOP Classes	User of Service(SCU)	Provider of Service (SCP)
Transfer		
Ultrasound Image Storage	Yes	No
Ultrasound Multiframe Image Storage	Yes	No
Storage Commitment Push Model	Yes	No
Comprehensive SR	Yes	No
Workflow Management		
Modality Worklist	Yes	No
Modality Performed Procedure Step	Yes	No
Print Management		
Basic Grayscale Print Management	Yes	No
Basic Color Print Management	Yes	No

Table 80: Network Services

Table 81 specifies the Media Storage Application Profiles supported.

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
STD-US-DC-SF-&MF-CDR	Yes / No	No
STD-US-DC-SF-&MF-DVD	Yes / No	No
STD-GEN-USB-JPEG	No	No

Table 81: MEDIA SERVICES