Canon

No. 2G985-028EN*C

DICOM CONFORMANCE STATEMENT

FOR

CANON PICTURE ARCHIVING AND COMMUNICATION SYSTEMS

TFS-01

V6.0 SP0000J OR LATER

CANON MEDICAL SYSTEMS CORPORATION

Trademarks

IMPORTANT!

(3) Please refer to the Canon Medical Systems Corporation website for the most recent version of this conformance statement.
Global: https://www.medical.canon/Interoperability/DICOM/EN
Japan: https://www.medical.canon/Interoperability/DICOM/JP

1 CONFORMANCE STATEMENT OVERVIEW

This product is a self-contained networked computer system used for archiving diagnostic medical images. It allows external systems to send images to it for permanent storage, retrieve information about such images, and retrieve the images themselves. The system conforms to the DICOM standard to allow the sharing of medical information with other digital imaging systems.

Table 1.1
NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Verification		
Verification	Yes	Yes
Transfer		
Computed Radiography Image Storage	Yes	Yes
Digital X-Ray Image Storage - For Presentation	Yes	Yes
Digital Mammography X-Ray Image Storage - For Presentation	Yes	Yes
Digital Intra-oral X-Ray Image Storage - For Presentation	Yes	Yes
CT Image Storage	Yes	Yes
Enhanced CT Image Storage	Yes	Yes
US Multi-frame Image Storage	Yes	Yes
MR Image Storage	Yes	Yes
Enhanced MR Image Storage	Yes	Yes
US Image Storage	Yes	Yes
Enhanced US Volume Storage	Yes	Yes
Secondary Capture Image Storage	Yes	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	Yes
Multi-frame True Color Secondary Capture Image Storage	Yes	Yes
Grayscale Softcopy Presentation State Storage	Yes	Yes
Grayscale Planar MPR Volumetric Presentation State Storage	Yes	Yes
XA Image Storage	Yes	Yes
RF Image Storage	Yes	Yes
X-Ray 3D Angiographic Image Storage	Yes	Yes
Breast Tomosynthesis Image Storage	Yes	Yes
Breast Projection X-Ray Image Storage - For Presentation	Yes	Yes
IVOCT Image Storage - For Presentation	Yes	Yes
IVOCT Image Storage - For Processing	Yes	Yes
NM Image Storage	Yes	Yes
Spatial Fiducials Storage	Yes	Yes
VL Endoscopic Image Storage	Yes	Yes

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
VL Photographic Image Storage	Yes	Yes
Basic Text SR Storage	Yes	Yes
Enhanced SR Storage	Yes	Yes
Comprehensive SR Storage	Yes	Yes
Mammography CAD SR Storage	Yes	Yes
Key Object Selection Document	Yes	Yes
X-Ray Radiation Dose SR Storage	Yes	Yes
Encapsulated PDF Storage	Yes	Yes
PET Image Storage	Yes	Yes
RT Image Storage	Yes	Yes
RT Dose Storage	Yes	Yes
RT Structure Set Storage	Yes	Yes
RT Beams Treatment Record Storage	Yes	Yes
RT Plan Storage	Yes	Yes
RT Treatment Summary Record Storage	Yes	Yes
Toshiba US Private Data Storage	Yes	Yes
MI 3D Softcopy Presentation State	Yes	Yes
Storage Commitment		
Storage Commitment Push Model	No	Yes
Query/Retrieve		
Patient Root Q/R - FIND	No	Yes
Patient Root Q/R - MOVE	No	Yes
Study Root Q/R - FIND	Yes	Yes
Study Root Q/R - MOVE	Yes	Yes
Workflow Management		
Modality Worklist	No	Yes

Note that Relational Queries are not supported either as an SCU or SCP

This product implements the WADO-URI services and the WADO-RS services for access to DICOM SOP Instances that are stored on the system, the STOW-RS service for storing DICOM SOP Instance into the system, and the QIDO-RS service which allow the client to search for studies, series or sop instances stored in the system. Those WADO, STOW, and QIDO services are only available as a plug in option for the system. This conformance claim refers to the conformance claim for the system for all such services.
Table 1.2 provides an overview of the network services supported by those services.

Table 1.2
NETWORK SERVICES

Network Service	User of Service (Client)	Provider of Service (Server)
Web Access to DICOM Objects (WADO)		
WADO-URI - Retrieve Imaging Document	No	Yes
WADO-URI - Retrieve Rendered Imaging Document	No	Yes
WADO-RS - Retrieve Study	No	Yes
WADO-RS - Retrieve Series	No	Yes
WADO-RS - Retrieve Instance	No	Yes
WADO-RS - Retrieve Frames	No	Yes
WADO-RS - Retrieve Bulkdata	No	Yes
WADO-RS - Retrieve Pixeldata	No	Yes
WADO-RS - Retrieve Metadata	No	Yes
Storage Over the Web (STOW)		
STOW-RS - Store Instances	No	Yes
Query by ID for DICOM Objects (QIDO)		
QIDO-RS - Search for Studies	No	Yes
QIDO-RS - Search for Series	No	Yes
QIDO-RS - Search for Instances	No	Yes

.

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3 INTRODUCTION

3.1. REVISION HISTORY

REV.	Date	Author	Description
*	December 12, 2016	TMSC	Initial Version
A	January 4, 2018	Canon Medical Systems	Change of company name
B	January 31, 2018	Canon Medical Systems	Add following SOP Classes and Role - Breast Projection X-Ray Image Storage - For Presentation SCU/SCP
C	June 15, 2023	Canon Medical Systems	Add following SOP Classes and Role - X-Ray 3D Angiographic Image Storage - Multi-frame Grayscale Byte Secondary Capture Image Storage - Grayscale Planar MPR Volumetric Presentation State Storage - Spatial Fiducials Storage - MI 3D Softcopy Presentation State Add following DICOMWeb Service - WADO Service - STOW Service - QIDO Service Change of Implementation Version Name and Default AE Title

3.2. AUDIENCE

This document is intended for hospital staff, health system integrators, software designers, service staff, and implementers. It is assumed that the reader has a working understanding of DICOM.

3.3. REMARKS

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of the intended information.

The scope of this Conformance Statement is to facilitate communication between the product and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. However, by itself, this Conformance Statement does not guarantee the desired interoperability and successful interconnectivity.

The user should be aware of the following important issues:

— Comparison of the different conformance statements is the first step towards assessing the interconnectivity between the product and other equipment.
— Test procedures should be defined to validate the desired level of connectivity.

— The DICOM standard is evolving to meet the future requirements of users. Canon Medical Systems Corporation is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue them.

3.4. TERMS AND DEFINITIONS

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 endian 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.

3.5. BASICS OF DICOM COMMUNICATION

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted in italics below. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two Application Entities (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network “handshake”. One of the two devices must initiate an Association (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (Negotiation).

DICOM specifies a number of network services and types of information objects, each of which is called an Abstract Syntax for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted Transfer Syntaxes. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called Presentation Contexts. The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on Roles – which one is the Service Class User (SCU - client) and which is the Service Class Provider (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

3.6. ABBREVIATIONS

ACSE	Association Control Service Element
AE	Application Entity
AET	Application Entity Title
CR	Computed Radiography
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
IE	Information Entity
IOD	Information Object Definition
ISO	International Standards Organization
IVOCT	Intravascular Optical Coherence Tomography
IVUS	Intravascular Ultrasound
JSON	JavaScript Object Notation
KO	Key Object Selection
MR	Magnetic Resonance
MWM	Modality Worklist Management
NM	Nuclear Medicine
PDU	Protocol Data Unit
QIDO-RS	Query based on ID for DICOM Objects by RESTful Services
PET	Positron Emission Tomography
REST	Representational State Transfer
RESTful	A service implemented using the REST architecture
RF	Radiofluoroscopy
PR	Presentation State
RTIMAGE	Radiotherapy Image
RTDOSE	Radiotherapy Dose
RTPLAN	Radiotherapy Plan
RTRECORD	RT Treatment Record
RTSTRUCT	Radiotherapy Structure Set
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
STOW-RS	STore Over the Web by RESTful Services
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
US	Ultrasound
VM	Value Multiplicity
VR	Value Representation

XA	X-Ray Angiography
WADO-RS	Web Access to DICOM Objects by RESTful Services
WADO-URI	Web Access to DICOM Objects by URI
XML	eXtensible Markup Language

3.7. REFERENCES

Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/

4 NETWORKING

4.1. IMPLEMENTATION MODEL

4.1.1. Application Data Flow

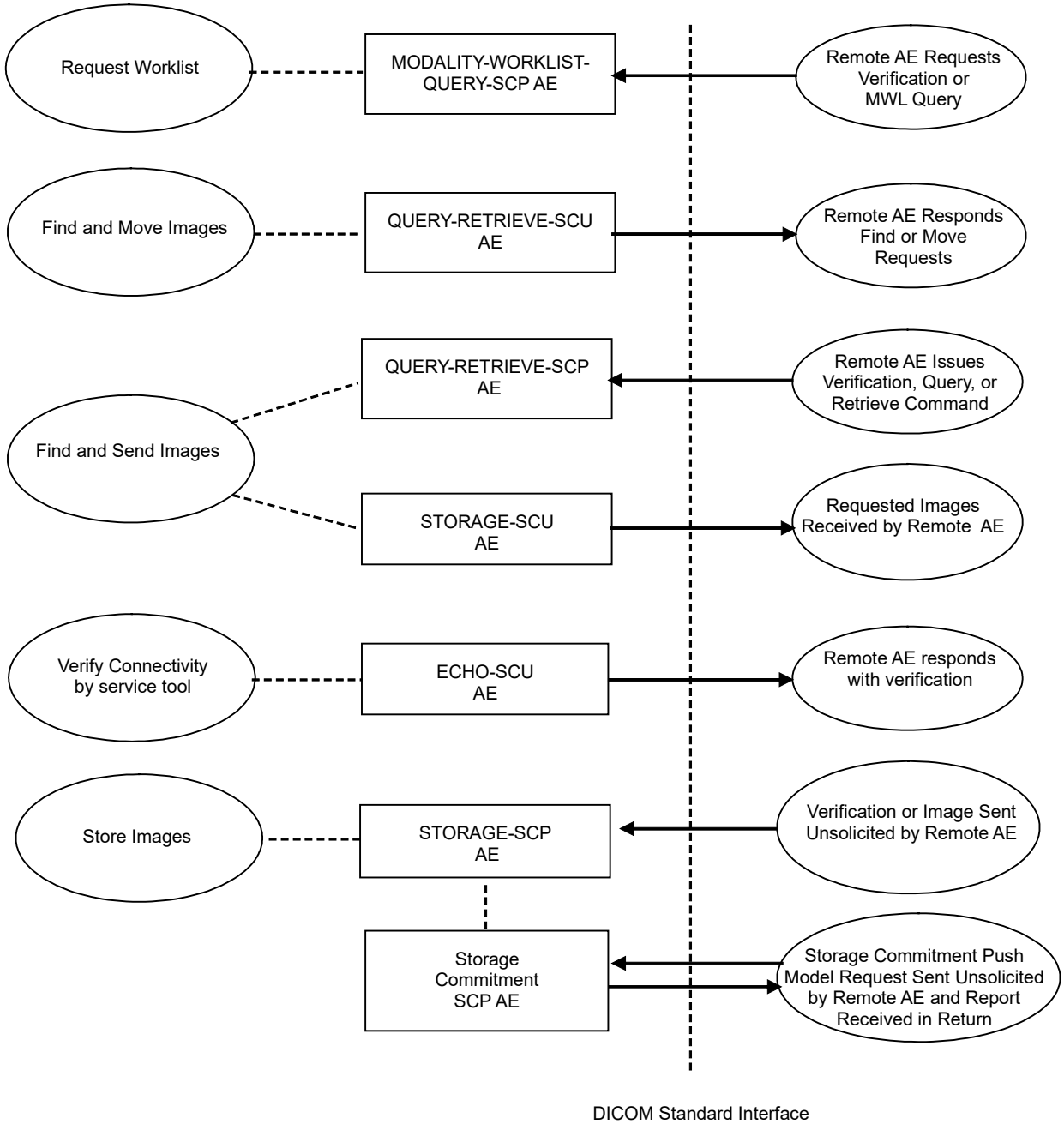

Figure 4.1-1
DICOM DATA FLOW DIAGRAM

— The STORAGE-SCU AE can send Composite SOP Instances. It sends DICOM images to the specified DICOM destination.

— The QUERY-RETRIEVE-SCP AE can handle incoming query and retrieve requests. It can handle external queries for Patient, Study, Series, and Image data, and also handle Image retrieval requests. The QUERY-RETRIEVE-SCP AE handles retrieval requests by issuing a command to the STORAGE-SCU AE to send the requested Images to the destination specified by the Remote AE. The QUERY-RETRIEVE-SCP AE functions as an SCP for C-FIND and C-MOVE requests.

— The STORAGE-SCP AE can receive incoming DICOM images and add them to the database. It can respond to external Storage and Verification Requests as a Service Class Provider (SCP) for C-STORE and C-ECHO requests. The STORAGE-SCP AE can also handle Storage Commitment Push Model Requests. It can thus be used to query whether the product will confirm ownership and responsibility for specific Composite SOP Instances. The STORAGE-SCP AE currently only supports image type Composite SOP Instances.

— The ECHO-SCU AE can send verification requests to the specified DICOM destination.

— The MODALITY-WORKLIST-QUERY-SCP AE can handle incoming query requests. It can handle external queries for modality worklist data,

— The QUERY-RETRIEVE-SCU AE queries a remote AE for lists of studies, series, images and sends the retrieve requests for selected studies, series, images.

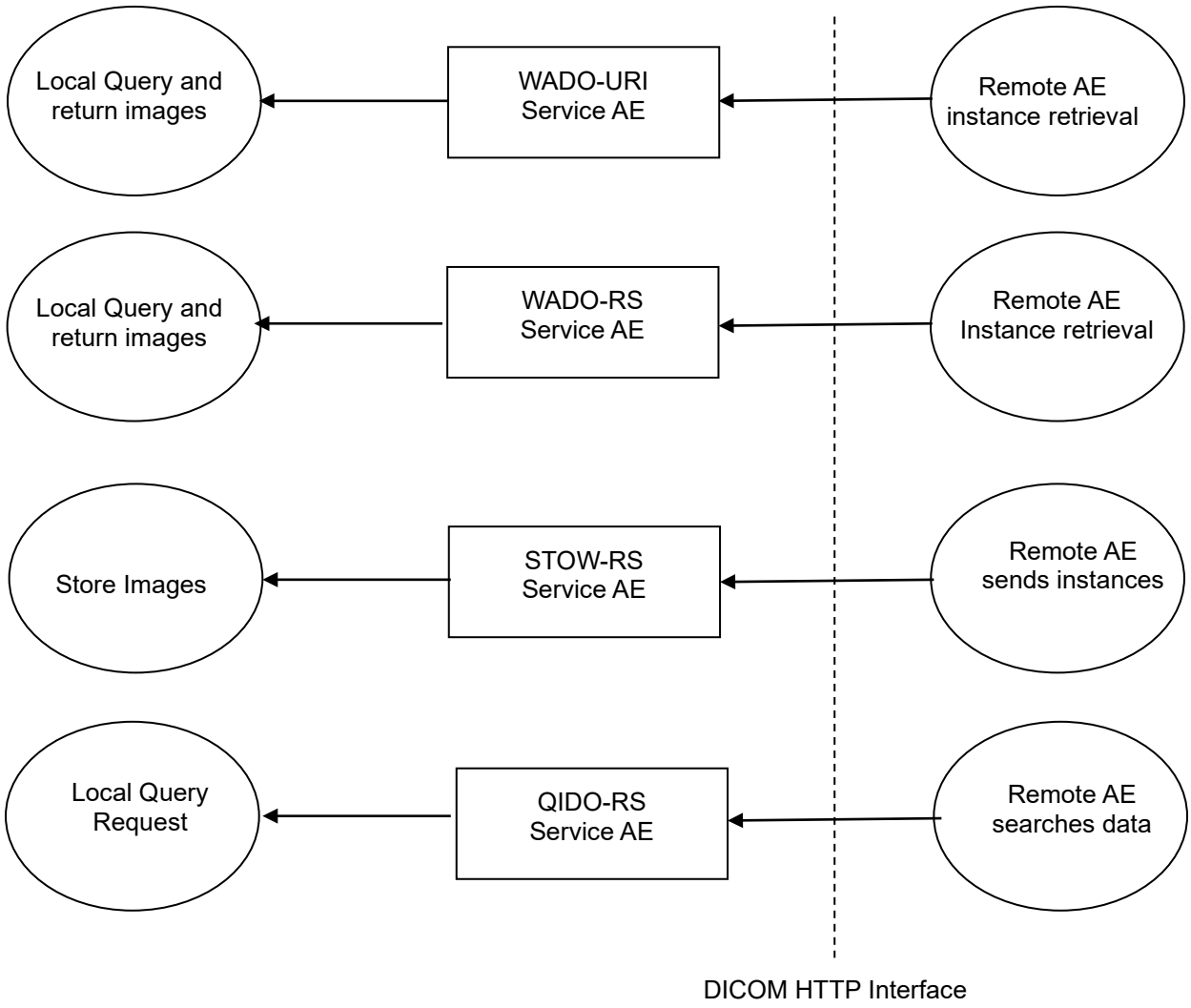

Figure 4.1-2
DICOM WEB SERVICE DATA FLOW DIAGRAM

The WADO-URI and WAD-RS Service AE receives WADO requests from a remote AE. These requests may be either over the URI or RS interfaces. It is associated with the local real-world activity "Retrieve Images". It converts these requests into internal lookup functions to find the matching SOP Instances. It then obtains these matching SOP Instances and composes a response back to the requesting remote AE.

The STOW-RS Service AE receives STOW requests from a remote AE. These requests are HTTP POST requests. It is associated with the local real-world activity "Store Instances". It converts these requests into internal functions to store the given SOP Instances. It returns a summary HTTP status line, including a status code and an associated textual phase, followed by an XML message indicating success, warning, or failure for each instance to the requesting remote AE.

The QIDO-RS Service AE receives QIDO requests from a remote AE. These requests are HTTP GET requests. It is associated with the local real-world activity "Query Remote Device". It uses the request to select matching Studies, Series or Instances. It then returns a set of matching Studies, Series or Instances or a response code indicating warning or failure back to the requesting device.

4.1.2. Functional Definition of AEs

4.1.2.1. Functional Definition of STORAGE-SCU AE

The STORAGE-SCU AE can be invoked by the QUERY-RETRIEVE-SCP AE to trigger the transfer of specific images to a remote destination AE. The STORAGE-SCU AE must be correctly configured with the host and port number of any external DICOM AE's that are to be C-MOVE retrieval destinations. Some conversion of the DICOM image objects is possible if the original Presentation Context is not supported by the remote destination AE or if compression is preferred.

4.1.2.2. Functional Definition of QUERY-RETRIEVE-SCP AE

The QUERY-RETRIEVE-SCP AE waits for another application to connect at the presentation address configured for its AE Title. When another application connects, QUERY-RETRIEVE-SCP AE expects it to be a DICOM application. QUERY-RETRIEVE-SCP AE will accept Associations with Presentation Contexts for SOP Classes of the DICOM Query-Retrieve Service Class, and Verification Service Class. It will handle query and retrieve requests on these Presentation Contexts and respond with data objects with values corresponding to the contents of the database. For C-MOVE requests the destination for the image objects is determined from the Destination AE Title contained in the C-MOVE request. When a retrieval request is received, the QUERY-RETRIEVE-SCP AE issues a command to the STORAGE-SCU AE to send the specified images to the C-MOVE Destination AE.

4.1.2.3. Functional Definition of STORAGE-SCP AE

The STORAGE-SCP AE waits for another application to connect at the presentation address configured for its AE Title. When another application connects, the STORAGE-SCP AE expects it to be a DICOM application. The STORAGE-SCP AE will accept Associations with Presentation Contexts for SOP Classes of the Verification, Storage, and Storage Commitment Service Classes. Any images received on such Presentation Contexts will be added to the database. If a Storage Commitment Push Model N-ACTION Request is received then the STORAGE-COMMITMENT-SCP AE will immediately check if the referenced Composite SOP Instances are in the database and return an N-EVENT-REPORT Notification. It will never 'cache' Storage Commitment Push Model Requests and wait for Composite SOP Instances to be received at a later time.

4.1.2.4. Functional Definition of ECHO-SCU AE

The ECHO-SCU AE sends a C-ECHO request and waits for response. The success or failure of operation is reported to the user. The operation is performed by a service tool.

4.1.2.5. Functional Definition of MODALITY-WORKLIST-QUERY-SCP AE

The MODALITY-WORKLIST-QUERY-SCP AE waits for another application to connect at the presentation address configured for its AE Title. When another application connects, MODALITY-WORKLIST-QUERY-SCP AE expects it to be a DICOM application. MODALITY-WORKLIST- QUERY-SCP AE will accept Associations with Presentation Contexts for SOP Classes of the DICOM Modality Worklist Query Service Class, and Verification Service Class. It will handle query requests on these Presentation Contexts and respond with data objects with values corresponding to the contents of the database.

4.1.2.6. Functional Definition of QUERY-RETRIEVE-SCU AE

The QUERY-RETRIEVE-SCU AE is activated when the user selects a remote node to query and enters some key information, Patient's Name, Patient ID, Modality and/or Study Date. The user can select studies to be retrieved. The images will be received at the STORGE-SCP AE.

4.1.2.7. Functional Definition of WADO-URI and WADO-RS Service AE

The reception of a WADO-URI and WADO-RS request will activate the AE. An internal request is sent to the search capabilities of the WADO-URI and WADO-RS SERVICE. This request is based upon the request parameters or the URL resource end point from the WADO-URI and WADO-RS request. The response is a list of all SOP instances stored on the system that match the request parameters. If there are no matching instances, the AE will indicate this in the WADO-URI and WADO-RS response. For all matching instances, the AE will utilize the internal image transfer request to obtain a copy of each instance. If the request was for retrieval of instances, these instances will be returned. If the request was for retrieval of rendered instances, then the AE will render each instance and return the rendered results.

4.1.2.8. Functional Definition of STOW Service AE

The reception of a STOW-RS POST request will activate the STOW-RS Service. The storage request is based upon the accept headers in the STOW-RS POST request. The response includes an HTTP status line, including a status-code and its associated textual phrase, followed by an XML message indicating success, warning, or failure for each instance stored by the STOW-RS service.

4.1.2.9. Functional Definition of QIDO Service AE

The reception of a QIDO-RS GET request will activate the QIDO-RS Provider. An internal query request may be sent to the search capabilities of the associated PACS or Vendor Neutral Archive (VNA). The search result is based upon the URL of the QIDO-RS GET request. The response is a status code indicating the success, warning, or failure of the search along with any matching results stored in the associated PACS or VNA.

4.1.3. Sequencing of Real-World Activities

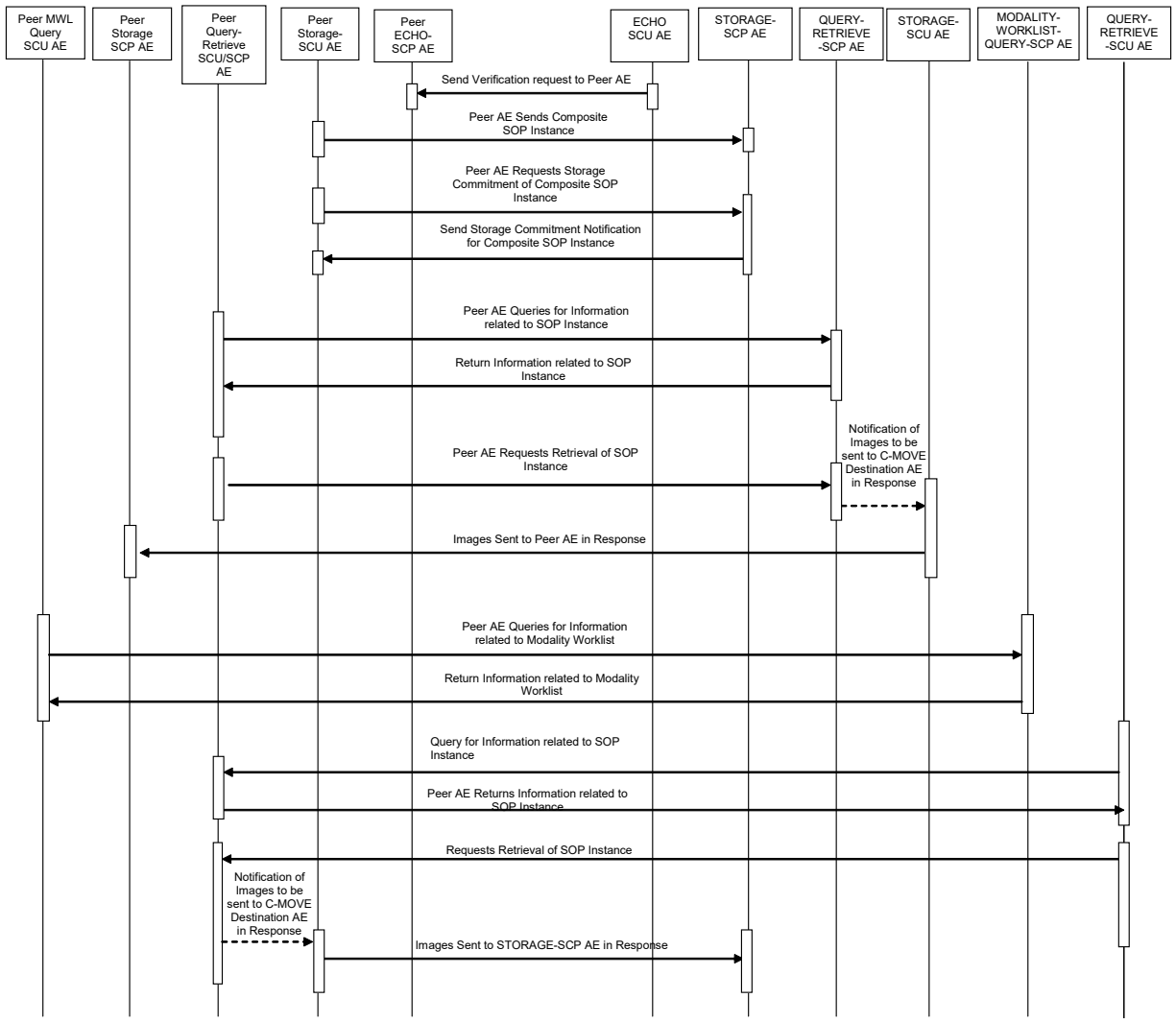

Figure 4.1-3
SEQUENCING CONSTRAINTS

4.2. AE SPECIFICATIONS

4.2.1. STORAGE-SCU AE Specification

4.2.1.1. SOP Classes

The STORAGE-SCU AE provides Standard Conformance to the following SOP Classes:

Table 4.2-1
SOP CLASSES FOR STORAGE-SCU AE

SOP Class Name	SOP Class UID	SCU	SCP
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	No
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	No
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Yes	No
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Yes	No
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	No
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes	No
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	No
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes	No
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
Grayscale Planar MPR Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.6	Yes	No
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	No
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	Yes	No
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	Yes	No
Breast Projection X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4	Yes	No
IVOCT Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.14.1	Yes	No
IVOCT Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.14.2	Yes	No
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	No
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	Yes	No
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	No
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	No
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	Yes	No

SOP Class Name	SOP Class UID	SCU	SCP
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	Yes	No
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes	No
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	No
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	No
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes	No
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes	No
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes	No
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	No
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Yes	No
Toshiba US Private Data Storage	1.2.392.200036.9116.7.8.1.1.1	Yes	No
MI 3D Softcopy Presentation State	1.3.6.1.4.1.16978.3.1	Yes	No

4.2.1.2. Association Establishment Policies

4.2.1.2.1. General

The STORAGE-SCU AE can only form Associations when requested to do so by the QUERY-RETRIEVE-SCP AE. The STORAGE-SCU AE can only request the opening of an Association. It cannot accept requests to open Associations from external Application Entities.

The DICOM standard Application Context Name for DICOM is always proposed:

Table 4.2-2
DICOM APPLICATION CONTEXT FOR STORAGE-SCU AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2. Number of Associations

The maximum number of simultaneous Associations is configurable, but is usually limited to a maximum of 15. This configuration largely depends on whether relatively quick response to multiple simultaneous C-MOVE Destination AE's is required or maximum throughput performance is required. If the latter is the case, then no simultaneous Associations are permitted, in order to reduce disk thrashing and thus maximize throughput. The STORAGE-SCU AE can initiate simultaneous Associations to a given external C-MOVE Destination AE up to the maximum number configured. There is no separate limit on the maximum number permitted to the same C-MOVE Destination AE.

If the first attempt to open an Association fails then the STORAGE-SCU AE will reschedule the task to attempt it again after a configurable time delay. The number of times to reattempt Association establishment is configurable, with the default being 1.

Table 4.2-3
NUMBER OF ASSOCIATIONS AS A SCU FOR STORAGE-SCU AE

Maximum number of simultaneous Associations	2 (Configurable)

4.2.1.2.3. Asynchronous Nature

The STORAGE-SCU AE does not support asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 4.2-4
ASYNCHRONOUS NATURE AS A SCU FOR STORAGE-SCU AE

Maximum number of outstanding asynchronous transactions	1

4.2.1.2.4. Implementation Identifying Information

Table 4.2-5
DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE-SCU AE

Implementation Class UID	1.2.392.200036.9116.7.28.1
Implementation Version Name	CM_OT_TFS01_1.0

Note that the STORAGE-SCU AE and QUERY-RETRIEVE-SCP AE use the same Implementation Class UID. All the product AE's use the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

4.2.1.3. Association Initiation Policy

4.2.1.3.1. Activity – Send Images Requested by an External Peer AE

4.2.1.3.1.1. Description and Sequencing of Activity

The STORAGE-SCU AE will initiate a new Association when the QUERY-RETRIEVE-SCP AE invokes the STORAGE-SCU AE to transmit images. The QUERY-RETRIEVE-SCP AE will issue such a command whenever it receives a valid C-MOVE Request. An Association Request is sent to the specified C-MOVE Destination AE and upon successful negotiation of the required Presentation Context the image transfer is started. In all cases an attempt will be made to transmit all the indicated images in a single Association, but this may not always be possible. The Association will be released when all the images have been sent. If an error occurs during transmission over an open Association then the image transfer is halted. The STORAGE-SCU AE will not attempt to independently retry the image export.

Note that the STORAGE-SCU AE does not support the unsolicited sending of SOP Instances using the DICOM Storage Service Class. It will only send SOP Instances in response to a C-MOVE Request from a peer AE.

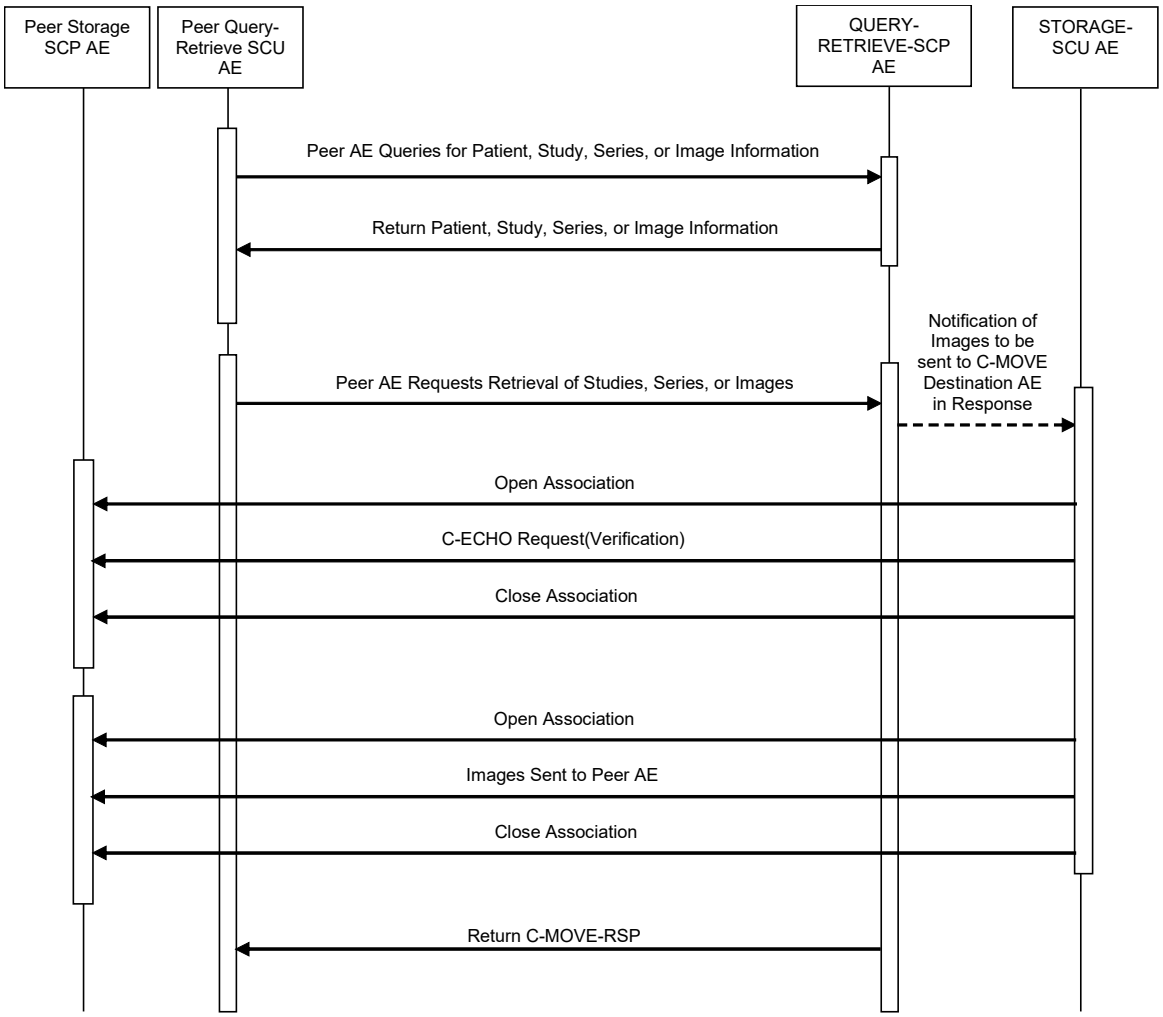

Figure 4.2-1
SEQUENCING OF ACTIVITY - SEND IMAGES REQUESTED BY AN EXTERNAL PEER AE

The following sequencing constraints illustrated in Figure 4.2-1 apply to the STORAGE-SCU AE:

1. Peer AE requests retrieval of Study, Series, or Images from QUERY-RETRIEVE-SCP AE (C-MOVE-RQ).
2. QUERY-RETRIEVE-SCP AE signals STORAGE-SCU AE to send the image Composite SOP Instances indicated in the C-MOVE-RQ to the C-MOVE Destination AE.
3. STORAGE-SCU AE opens a new Association with the indicated C-MOVE Destination AE.
4. STORAGE-SCU AE issues a Verification request (C-ECHO) and the indicated C-MOVE Destination AE replies with a C-ECHO response (status success).
5. STORAGE-SCU AE closes the Association.
6. STORAGE-SCU AE opens a new Association with the indicated C-MOVE Destination AE.
7. STORAGE-SCU AE sends the indicated Composite SOP Instances.
8. STORAGE-SCU AE closes the Association.

4.2.1.3.1.2. Proposed Presentation Contexts

STORAGE-SCU AE will propose Presentation Contexts as shown in the following table:

Table 4.2-6
PROPOSED PRESENTATION CONTEXTS BY THE STORAGE-SCU AE

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Grayscale Planar MPR Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.6	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
Breast Projection X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
IVOCT Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.14.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
IVOCT Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.14.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
		JPEG 2000 Image Compression (LosslessOnly)	1.2.840.10008.1.2.4.90	SCU	None
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Toshiba US Private Data Storage	1.2.392.200036.9116.7.8.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
MI 3D Softcopy Presentation State	1.3.6.1.4.1.16978.3.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

4.2.1.3.1.3. SOP Specific Conformance for Verification SOP Class

Standard conformance is provided to the DICOM Verification Service Class as an SCU. The Verification Service as an SCU is actually only supported as a diagnostic service tool for network communication issues.

4.2.1.3.1.4. SOP Specific Conformance for Image SOP Classes

The STORAGE-SCU AE will exhibit the following Behavior according to the Status Code value returned in a C-STORE Response from a destination C-STORE SCP:

Table 4.2-7
STORAGE-SCU AE C-STORE RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	Success indication message is output to the Service Logs. No message is posted to the User Interface
Error	Cannot Understand	CXXX	Several retries are performed, but if errors continue to be detected, it is considered as a permanent failure. The association is terminated when the error occurs. A failure message is output to the Service Log. No messages are sent to the user interface.
Error	Failure	Status codes other than the above	Several retries are performed, but if errors continue to be detected, it is considered as a permanent failure. The association is terminated when the error occurs. A failure message is output to the Service Log. No messages are sent to the user interface.

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

Table 4.2-8
STORAGE-SCU AE COMMUNICATION FAILURE BEHAVIOR

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	The Association is aborted using a DICOM A-ABORT and a message is sent to the QUERY-RETRIEVE-SCP AE indicating an export failure. The QUERY-RETRIEVE-SCP AE will send an appropriate Status in the C-MOVE Response. Error indication message is output to the Service Logs. No message is posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted using a DICOM A-ABORT and a message is sent to the QUERY-RETRIEVE-SCP AE indicating an export failure. The QUERY-RETRIEVE-SCP AE will send an appropriate Status in the C-MOVE Response. Error indication message is output to the Service Logs. No message is posted to the User Interface.
Association A-ABORTed by the SCP or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	A message is sent to the QUERY-RETRIEVE-SCP AE indicating an export failure. The QUERY-RETRIEVE-SCP AE will send an appropriate Status in the C-MOVE Response. Error indication message is output to the Service Logs. No message is posted to the User Interface.

4.2.1.4. Association Acceptance Policy

The STORAGE-SCU AE does not accept Associations.

4.2.2. ECHO-SCU AE Specifications

4.2.2.1. SOP Class

The ECHO-SCU AE provides Standard Conformance to the following DICOM SOP classes:

Table 4.2-9
SOP CLASSES FOR ECHO-SCU AE

SOP Class	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No

4.2.2.2. Association Establishment Policies

4.2.2.2.1. General

The ECHO-SCU AE can form associations via diagnostic service tool. The ECHO-SCU AE can only request the starting of an association. It cannot accept association start requests from external application entities.
The DICOM Standard Application Context Names for DICOM is always proposed.

Table 4.2-10
DICOM APPLICATION CONTEXTS FOR ECHO-SCU AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.2.2.2. Number of Associations

The maximum number of simultaneous Associations is configurable, but is usually limited to a maximum of 15.

Table 4.2-11
NUMBERS OF ASSOCIATIONS AS A SCU FOR ECHO-SCU AE

Maximum Number of Simultaneous Associations	2 (Configurable)

4.2.2.2.3. Asynchronous Nature

The ECHO -SCU AE does not support asynchronous communication (multiple incomplete transactions on a single association). All association requests must be completed and confirmed before new actions can be performed.

Table 4.2-12
ASYNCHRONOUS NATURE AS A SCU FOR ECHO-SCU AE

Maximum Number of Outstanding Asynchronous Transactions	1

4.2.2.2.4. Implementation Identification Information

Table 4.2-13
DICOM IMPLEMENTATION CLASS AND VERSION FOR ECHO-SCU AE

Implementation Class UID	1.2.392.200036.9116.7.28.1
Implementation Version Name	CM_OT_TFS01_1.0

All the product AEs have the same implementation version name. This version name is updated with each new software release; therefore, independent releases of different AE versions will not occur.

4.2.2.3. Association Initiation Policy

4.2.2.3.1. Activity - Verify Connectivity

4.2.2.3.1.1. Destination and Sequencing of Activity

The ECHO-SCU AE initiates association through user control.

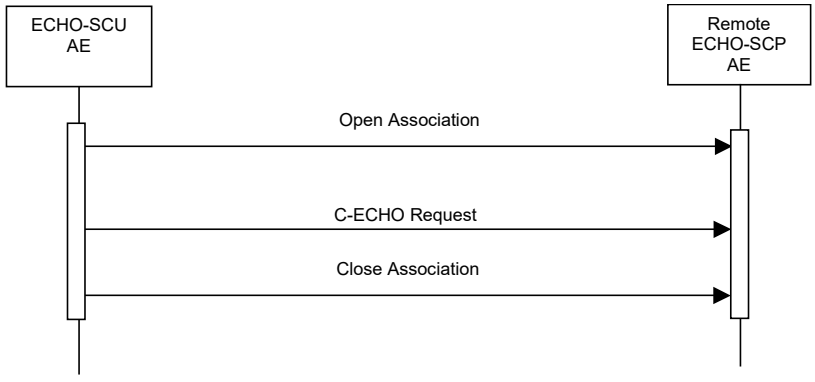

Figure 4.2-2
SEQUENCING OF ACTIVITY – ECHO

The following sequencing restrictions, illustrated in figure 4.2-2, apply when the ECHO-SCU AE:

1. The ECHO-SCU AE opens a new association with the specified destination AE.
2. The ECHO -SCU AE sends C-ECHO requests.

3. The ECHO -SCU AE closes the Association.

4.2.2.3.1.2. Proposed Presentation Context

The ECHO-SCU AE is capable of proposing the Presentation Contexts shown in the following table:

Table 4.2-14
PROPOSED PRESENTATION CONTEXTS BY THE ECHO-SCU AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

4.2.2.3.1.3. SOP Specific Conformance for Verification SOP Class

The product monitors the status, and service log files can be used to diagnose problems that may occur. If an error occurs in DICOM transmission, an appropriate message will be entered into the service log.
The ECHO-SCU AE performs the following actions based on the status code values in the C-ECHO responses from the destination C-ECHO SCP:

Table 4.2-15
ECHO-SCU AE C-ECHO RESPONSE STATUS ACTIONS

Service Status	Detailed Meaning	Error Code	Action
Success	Success	0000	No message is posted to the User Interface.
Error	Cannot Understand	CXXX	Several retries are performed, but if errors continue to be detected, it is considered as a permanent failure. The association is terminated when the error occurs. A failure message is output to the Service Log. No messages are sent to the user interface.
Error	Failure	Status codes other than the above	Several retries are performed, it is considered as a permanent failure. The association is terminated when the error occurs. A failure message is output to the Service Log. No messages are sent to the user interface.

4.2.2.4. Association Acceptance Policy

The ECHO-SCU AE does not accept associations.

4.2.3. QUERY-RETRIEVE-SCP AE Specification

4.2.3.1. SOP Classes

The QUERY-RETRIEVE-SCP AE provides Standard Conformance to the following SOP Classes:

Table 4.2-16
SOP CLASSES FOR QUERY-RETRIEVE-SCP AE

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	No	Yes
Patient Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	No	Yes
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	No	Yes

4.2.3.2. Association Policies

4.2.3.2.1. General

The DICOM standard Application Context Name for DICOM 3.0 is always accepted:

Table 4.2-17
DICOM APPLICATION CONTEXT FOR QUERY-RETRIEVE-SCP AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.3.2.2. Number of Associations

The QUERY-RETRIEVE-SCP AE can support up to 15 Associations at a time.

Table 4.2-18
NUMBER OF SIMULTANEOUS ASSOCIATIONS AS A SCP FOR QUERY-RETRIEVE-SCP AE

Maximum number of simultaneous Associations	15 (Configurable)

4.2.3.2.3. Asynchronous Nature

The QUERY-RETRIEVE-SCP AE does not support asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 4.2-19
ASYNCHRONOUS NATURE AS A SCP FOR QUERY-RETRIEVE-SCP AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

4.2.3.2.4. Implementation Identifying Information

The implementation information for the AE is:

Table 4.2-20
DICOM IMPLEMENTATION CLASS AND VERSION FOR QUERY-RETRIEVE-SCP AE

Implementation Class UID	1.2.392.200036.9116.7.28.1
Implementation Version Name	CM_OT_TFS01_1.0

4.2.3.3. Association Initiation Policy

The QUERY-RETRIEVE-SCP AE does not initiate Associations.

4.2.3.4. Association Acceptance Policy

4.2.3.4.1. Activity – Handling Query and Retrieval Requests

4.2.3.4.1.1. Description and Sequencing of Activity

The QUERY-RETRIEVE-SCP AE accepts Associations only if they have valid Presentation Contexts. If none of the requested Presentation Contexts are accepted then the Association Request itself is rejected. It can be configured to only accept Associations with certain hosts (using TCP/IP address) and/or AE Titles.

If QUERY-RETRIEVE-SCP AE receives a query (C-FIND) request then the response(s) will be sent over the same Association used to send the C-FIND-Request.

If QUERY-RETRIEVE-SCP AE receives a retrieval (C-MOVE) request then the responses will be sent over the same Association used to send the C-MOVE-Request. The QUERY-RETRIEVE-SCP AE will notify the STORAGE-SCU to send the requested SOP Instances to the C-MOVE Destination. The STORAGE-SCU AE notifies the QUERY-RETRIEVE-SCP AE of the success or failure of each attempt to send a Composite SOP Instance to the peer C-MOVE Destination AE. The QUERY-RETRIEVE-SCP AE then sends a C-MOVE Response indicating this status after each attempt. Once the STORAGE-SCU AE has finished attempting to transfer all the requested SOP Instances, the QUERY-RETRIEVE-SCP AE sends a final C-MOVE Response indicating the overall status of the attempted retrieval.

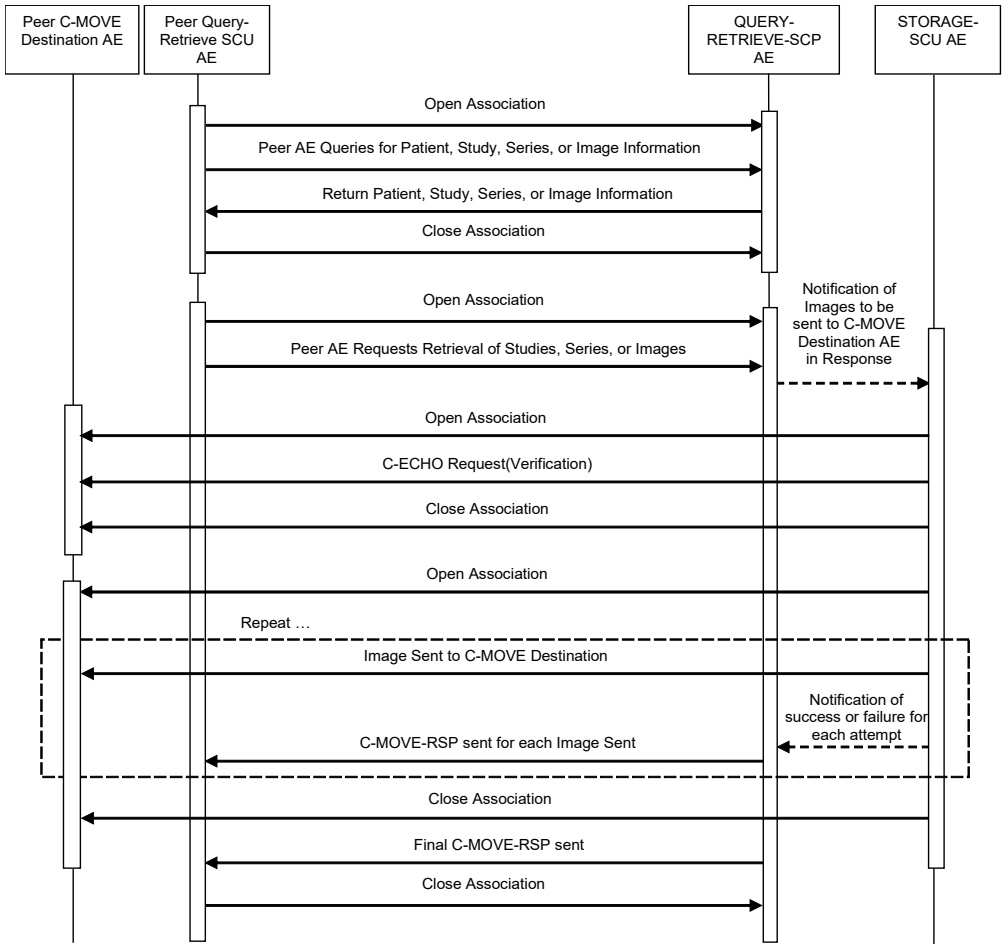

Figure 4.2-3
SEQUENCING OF ACTIVITY – HANDLING QUERY AND RETRIEVAL REQUESTS

The following sequencing constraints illustrated in Figure 4.2-3 apply to the QUERY-RETRIEVE-SCP AE for handling queries (C-FIND-Requests):

1. Peer AE opens an Association with the QUERY-RETRIEVE-SCP AE.
2. Peer AE sends a C-FIND-RQ Message
3. QUERY-RETRIEVE-SCP AE returns a C-FIND-RSP Message to the peer AE with matching information. A C-FIND-RSP is sent for each entity matching the identifier specified in the C-FIND-RQ. A final C-FIND-RSP is sent indicating that the matching is complete.
4. Peer AE closes the Association. Note that the peer AE does not have to close the Association immediately. Further C-FIND Requests can be sent over the Association before it is closed.

The following sequencing constraints illustrated in Figure 4.2-3 apply to the QUERY-RETRIEVE-SCP AE for handling retrievals (C-MOVE-Requests):

1. Peer AE opens an Association with the QUERY-RETRIEVE-SCP AE.
2. Peer AE sends a C-MOVE-RQ Message
3. QUERY-RETRIEVE-SCP AE notifies the STORAGE-SCU AE to send the Composite SOP Instances to the peer C-MOVE Destination AE as indicated in the C-MOVE-RQ.
4. STORAGE-SCU AE opens a new Association with the indicated C-MOVE Destination AE.
5. STORAGE-SCU AE issues a Verification request (C-ECHO) and the indicated C-MOVE Destination AE replies with a C-ECHO response (status success).
6. STORAGE-SCU AE closes the Association.
7. After attempting to send a SOP Instance, the STORAGE-SCU AE indicates to the QUERY-RETRIEVE-SCP AE whether the transfer succeeded or failed. The QUERY-RETRIEVE-SCP AE then returns a C-MOVE-RSP indicating this success or failure.
8. Once the STORAGE-SCU AE has completed all attempts to transfer the SOP Instances to the C-MOVE Destination AE, or the first failure occurred, the QUERY-RETRIEVE-SCP AE sends a final C-MOVE-RSP indicating the overall success or failure of the retrieval.
9. Peer AE closes the Association. Note that the peer AE does not have to close the Association immediately. Further C-MOVE Requests can be sent over the Association before it is closed.

The QUERY-RETRIEVE-SCP AE may reject Association attempts as shown in the table below. The Result, Source and Reason/Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4). The following abbreviations are used in the Source column:

a – DICOM UL service-user

b – DICOM UL service-provider (ACSE related function)

c – DICOM UL service-provider (Presentation related function)

Table 4.2-21
ASSOCIATION REJECTION REASONS

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
2 – rejected-transient	c	1 – temporary-congestion	Out of System resources.
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.

Result	Source	Reason/Diag	Explanation
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.

Note that C-MOVE fail if Q/R SCU AE send C-FIND and C-MOVE send over same association to default port. Please inquire port information and configure port setting to send Requests.

4.2.3.4.1.2. Accepted Presentation Contexts

QUERY-RETRIEVE-SCP AE will accept Presentation Contexts as shown in the following table:

Table 4.2-22
ACCEPTED PRESENTATION CONTEXTS BY THE QUERY-RETRIEVE-SCP AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Patient Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Patient Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Study Root Q/R Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Study Root Q/R Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

4.2.3.4.1.3. SOP Specific Conformance for Query SOP Classes

The QUERY-RETRIEVE-SCP AE supports hierarchical queries and not relational queries. Those attributes requested in the query identifier are returned.

Patient Root Information Model
Study Root Information Model

All the required search keys on each of the three levels (Patient,Study, Series, and Image) are supported.

Note that if QUERY-RETRIEVE-SCP AE receives a C-FIND-RQ Message of Study Root level included in both the range of Study Date and Study Time, then a C-FIND-RSP corresponding to both the ranges will be returned. (The combined datetime matching is applied without extended negotiation)

Table 4.2-23
PATIENT ROOT C-FIND SCP SUPPORTED ELEMENTS

Level Name Attribute Name	Tag	VR	Types of Matching
SOP Common			
Specific Character Set	0008,0005	CS	NONE
Patient Level			
Patient's Name	0010,0010	PN	S,*,U
Patient ID	0010,0020	LO	S,*,U
Patient's Birth Date	0010,0030	DA	S,U
Patient's Sex	0010,0040	CS	S,U

Table 4.2-24
STUDY ROOT C-FIND SCP SUPPORTED ELEMENTS

Level Name Attribute Name	Tag	VR	Types of Matching
SOP Common			
Specific Character Set	0008,0005	CS	NONE
Study Level			
Patient's Name	0010,0010	PN	S,*,U
Patient ID	0010,0020	LO	S,*,U
Patient's Birth Date	0010,0030	DA	S,U
Patient's Sex	0010,0040	CS	S,U
Patient's Comments	0010,4000	LT	NONE
Study Date	0008,0020	TM	S,R,*,U
Study Time	0008,0030	SH	R,*,U
Accession Number	0008,0050	SH	S,*,U
Modality in Study	0008,0061	CS	S,U,L
Study Description	0008,1030	LO	S,*,U
Study ID	0020,0010	SH	S,*,U
Study Instance UID	0020,000D	UI	S,U,L

Level Name Attribute Name	Tag	VR	Types of Matching
Series Level			
Modality	0008,0060	CS	S,U
Series Number	0020,0011	IS	S,*,U
Series Instance UID	0020,000E	UI	S,U,L
Image Level			
Instance Number	0020,0013	IS	S,*,U
SOP Instance UID	0008,0018	UI	S,U,L

The tables should be read as follows:

Attribute Name: Attributes supported for returned C-FIND Responses.

Tag: Appropriate DICOM tag for this attribute.

VR: Appropriate DICOM VR for this attribute.

Types of Matching: The types of Matching supported by the C-FIND SCP. A "S" indicates the identifier attribute can specify Single Value Matching, a “R” will indicate Range Matching, a “*” will denote wildcard matching, an ‘U’ will indicate universal matching, and ‘L’ will indicate that UID lists are supported for matching. “NONE” indicates that no matching is supported, but that values for this Element in the database can be returned.

Table 4.2-25
QUERY-RETRIEVE-SCP AE C-FIND RESPONSE STATUS RETURN BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	Matching is complete or Matching is reached to the maximum number of records (50,000 records) to be returned. No final identifier is supplied.
Refused	Out of Resources	A700	Out of System resources.
Failed	Identifier does not match SOP Class	A900	The C-FIND query identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class. Error message is output to the Service Log.
	Unable to process	C001	The C-FIND query identifier is valid for the specified SOP Class but cannot be used to query the database. Error message is output to the Service Log.
Pending	Matches are continuing and current match is supplied.	FF00	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if all Optional keys in the query identifier are actually supported.

4.2.3.4.1.4. SOP Specific Conformance for Retrieval SOP Classes

The QUERY-RETRIEVE-SCP AE will convey to the STORAGE-SCU AE that an Association with a DICOM AE named by the external C-MOVE SCU (through a MOVE Destination AE Title) should be established. It will also convey to the STORAGE-SCU AE to perform C-STORE operations on specific images requested by the external C-MOVE SCU. One or more of the Image Storage Presentation Contexts listed in table 4.2-6 will be negotiated.

An initial C-MOVE Response is always sent after confirming that the C-MOVE Request itself can be processed. After this, the QUERY-RETRIEVE-SCP AE will return a response to the C-MOVE SCU after the STORAGE-SCU AE has attempted to send each image.

Table 4.2-26
QUERY-RETRIEVE-SCP AE C-MOVE RESPONSE STATUS RETURN BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Sub-operations complete – No Failures	0000	All the Composite SOP Instances have been successfully sent to the C-MOVE Destination AE.
Refused	Out of Resources – Unable to calculate number of matches	A701	Number of matches cannot be determined due to system failure. Error message is output to the Service Log.
	Out of Resources – Unable to perform sub-operations	A702	C-STORE sub-operations cannot be performed due to failure to access Composite SOP Instances in archive, or failure of a C-STORE Request. Error message is output to the Service Log.
	Move destination unknown	A801	The Destination AE named in the C-MOVE Request is unknown to Query-Retrieve SCP AE. Error message is output to the Service Log.
Failed	Identifier does not match SOP Class	A900	The C-MOVE identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class or retrieval level. Error message is output to the Service Log.
Warning	Suboperations Complete – One or more Failures	B000	Image transmission is considered successful. It will send the appropriate PENDING or SUCCESS Status in the C-MOVE Response. Warning message is output to the Service Log.
Pending	Sub-operations are continuing	FF00	A Response with this Status Code is sent every time a Composite SOP Instance has been successfully sent to the C-MOVE Destination AE.

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Table 4.2-27
QUERY-RETRIEVE-SCP AE COMMUNICATION FAILURE BEHAVIOR

Exception	Behavior
Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. The QUERY-RETRIEVE-SCP AE is waiting for the next C-FIND or C-MOVE Request on an open Association but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error message is output to the Service Log.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout). I.e. The QUERY-RETRIEVE-SCP AE is waiting for the next message PDU but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error message is output to the Service Log.

Exception	Behavior
Association aborted by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	Error message is output to the Service Log.

4.2.4. STORAGE-SCP AE Specification

4.2.4.1. SOP Classes

The STORAGE-SCP AE provides Standard Conformance to the following SOP Classes:

Table 4.2-28
SOP CLASSES FOR STORAGE-SCP AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	No	Yes
Storage Commitment Push Model	1.2.840.10008.1.20.1	No	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	Yes
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	No	Yes
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	No	Yes
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	No	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	Yes
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	No	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	No	Yes
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	No	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	No	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	No	Yes
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	No	Yes
Grayscale Planar MPR Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.6	No	Yes
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1	No	Yes
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	No	Yes
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	No	Yes
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	No	Yes
Breast Projection X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4	No	Yes
IVOCT Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.14.1	No	Yes
IVOCT Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.14.2	No	Yes
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	No	Yes

SOP Class Name	SOP Class UID	SCU	SCP
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	No	Yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	No	Yes
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	No	Yes
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	No	Yes
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	No	Yes
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	No	Yes
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	No	Yes
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	No	Yes
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	No	Yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	No	Yes
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	No	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	No	Yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	No	Yes
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	No	Yes
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	No	Yes
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	No	Yes
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	No	Yes
Toshiba US Private Data Storage	1.2.392.200036.9116.7.8.1.1.1	No	Yes
MI 3D Softcopy Presentation State	1.3.6.1.4.1.16978.3.1	No	Yes

4.2.4.2. Association Policies

4.2.4.2.1. General

The STORAGE-SCP AE can both accept and propose Association Requests. The STORAGE-SCP AE will accept Association Requests for the Verification, Storage, and Storage Commitment Push Model Services. It will propose Associations only for the Storage Commitment Push Model Service.

The DICOM standard Application Context Name for DICOM 3.0 is always accepted and proposed:

Table 4.2-29
DICOM APPLICATION CONTEXT FOR STORAGE-SCP AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.4.2.2. Number of Associations

The STORAGE-SCP AE can support up to 5 Associations at a time.

The STORAGE-SCP AE initiates one Association at a time for sending Storage Commitment Push Model N-EVENT-REPORTs to peer AEs.

Table 4.2-30
NUMBER OF SIMULTANEOUS ASSOCIATIONS AS AN SCP FOR STORAGE-SCP AE

Maximum number of simultaneous Associations requested by peer AEs	5 (Configurable)
Maximum number of simultaneous Associations proposed by STORAGE-SCP AE	1

4.2.4.2.3. Asynchronous Nature

The STORAGE-SCP AE does not support asynchronous communication (multiple outstanding transactions over a single Association). The STORAGE-SCP AE does permit an SCU to send multiple Storage Commitment Push Model Requests before it has sent back any N-EVENT-REPORT Notifications. However, the STORAGE-SCP AE must send an N-ACTION Response before permitting another N-ACTION Request to be received so the DICOM communication itself is not truly asynchronous.

Table 4.2-31
ASYNCHRONOUS NATURE AS A SCP FOR STORAGE-SCP AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

There is no limit on the number of outstanding Storage Commitment Push Model Requests that can be received and acknowledged before the STORAGE-SCP AE has responded with the corresponding N-EVENT-REPORT Notifications.

Table 4.2-32
OUTSTANDING STORAGE COMMITMENT PUSH MODEL REQUESTS FOR STORAGE-SCP AE

Maximum number of outstanding Storage Commitment Requests for which no N-EVENT Notification has been sent	No Maximum Limit

4.2.4.2.4. Implementation Identifying Information

The implementation information for this AE is:

Table 4.2-33
DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE-SCP AE

Implementation Class UID	1.2.392.200036.9116.7.28.1
Implementation Version Name	CM_OT_TFS01_1.0

.

4.2.4.3. Association Initiation Policy

4.2.4.3.1. Activity – Send Storage Commitment Notification over new Association

4.2.4.3.1.1. Description and Sequencing of Activity

The STORAGE-SCP AE accepts Associations only if they have valid Presentation Contexts. If none of the requested Presentation Contexts are accepted then the Association Request itself is rejected. It can be configured to only accept Associations with certain hosts (using TCP/IP address) and/or AE Titles.

The STORAGE-SCP AE always open a new Association before sending a Storage Commitment Push Model Notifications (N-EVENT-REPORT), in which case the sequencing illustrated in Figure 4.2-4 will always be followed.

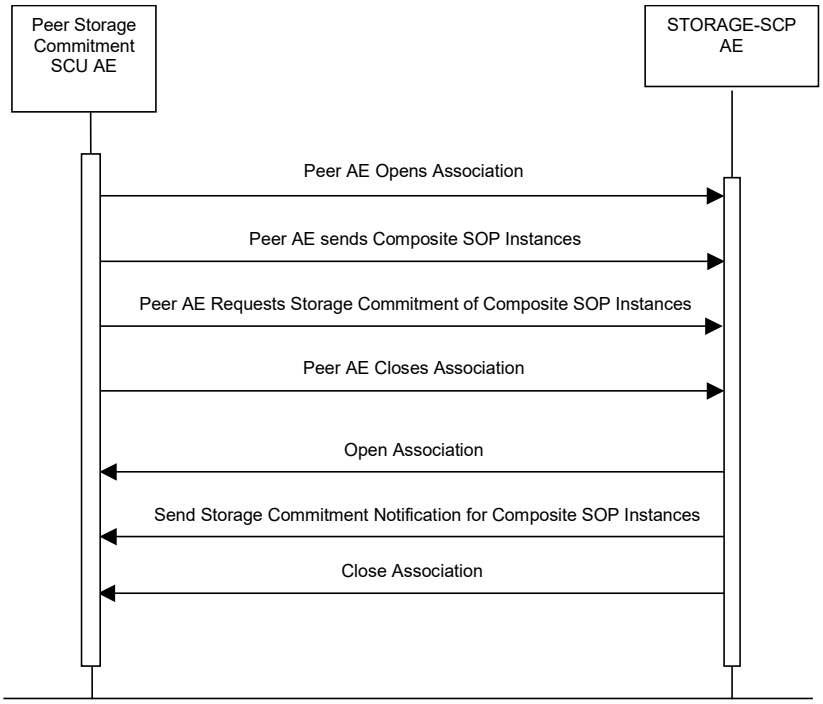

Figure 4.2-4
SEQUENCING OF ACTIVITY – SEND STORAGE COMMITMENT NOTIFICATION OVER NEW ASSOCIATION

The following sequencing constraints illustrated in Figure 4.2-4 apply to the STORAGE-SCP AE for handling Storage Commitment Push Model Requests using a new Association:

1. Peer AE opens an Association with the STORAGE-SCP AE.
2. Peer AE sends zero or more Composite SOP Instances.
3. Peer AE requests Storage Commitment of Composite SOP Instance(s) (peer sends N-ACTION-RQ and STORAGE-SCP AE responds with N-ACTION-RSP to indicate that it received the request).
4. Peer AE closes the Association before the STORAGE-SCP AE can successfully send the Storage Commitment Push Model Notification (N-EVENT-REPORT-RQ).
5. STORAGE-SCP AE opens an Association with the peer AE.
6. STORAGE-SCP AE sends Storage Commitment Push Model Notification (N-EVENT-REPORT). More than one can be sent over a single Association if multiple Notifications are outstanding.
7. STORAGE-SCP AE closes the Association with the peer AE.

.

The STORAGE-SCP AE may reject Association attempts as shown in the Table below. The Result, Source and Reason/Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4). The following abbreviations are used in the Source column:

a – DICOM UL service-user

b – DICOM UL service-provider (ACSE related function)

c – DICOM UL service-provider (Presentation related function)

Table 4.2-34
ASSOCIATION REJECTION REASONS

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
2 – rejected-transient	c	1 – temporary-congestion	Out of System resources.
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.

4.2.4.3.1.2. Accepted Presentation Contexts

The Verification SCP AE will accept Presentation Contexts as shown in the following table:

Table 4.2-35
ACCEPTED PRESENTATION CONTEXTS BY THE STORAGE-SCP AE

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Grayscale Planar MPR Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.6	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
Breast Projection X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
IVOCT Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.14.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
IVOCT Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.14.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
		JPEG Baseline	1.2.840.10008.1.2.4.50	SCP	None
		JPEG Extended	1.2.840.10008.1.2.4.51	SCP	None
		DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Toshiba US Private Data Storage	1.2.392.200036.9116.7.8.1.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
MI 3D Softcopy Presentation State	1.3.6.1.4.1.16978.3.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

4.2.4.3.1.3. SOP Specific Conformance for Verification SOP Class

The STORAGE-SCP AE provides standard conformance to the Verification SOP Class as an SCP.

4.2.4.3.1.4. SOP Specific Conformance for Storage SOP Class

The associated Activity with the Storage service is the storage of medical image data received over the network on a designated hard disk. The Storage SCP AE will return a failure status if it is unable to store the images on to the hard disk.

Table 4.2-36
STORAGE-SCP AE C-STORE RESPONSE STATUS RETURN REASONS

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The Composite SOP Instance was successfully received, verified, and stored in the system database.
Refused	Out of Resources	A700	Indicates that there was not enough disk space to store the image. Error message is output to the Service Log. The SOP Instance will not be saved.
Error	Data Set does not match SOP Class	A900	Indicates that the Data Set does not encode a valid instance of the SOP Class specified. This status is returned if the DICOM Object stream can be successfully parsed but does not contain values for one or more mandatory Elements of the SOP Class. The STORAGE-SCP AE does not perform a comprehensive check, as it only checks a subset of required Elements. In addition, if the SOP Class is for a type of image but the SOP Instance does not contain values necessary for its display then this status is returned. Error message is output to the Service Log.
	Cannot understand	C000	Indicates that the STORAGE-SCP AE cannot parse the Data Set into Elements. Error message is output to the Service Log.

4.2.4.3.1.5. SOP Specific Conformance for Storage Commitment SOP Class

The associated Activity with the Storage Commitment Push Model service is the communication by the STORAGE-SCP AE to peer AEs that it has committed to permanently store Composite SOP Instances that have been sent to it. It thus allows peer AEs to determine whether the product has taken responsibility for the archiving of specific SOP Instances so that they can be flushed from the peer AE system.

The STORAGE-SCP AE takes the list of Composite SOP Instance UIDs specified in a Storage Commitment Push Model N-ACTION Request and checks if they are present in the product database. As long as the Composite SOP Instance UIDs are present in the database, the STORAGE-SCP AE will consider those Composite SOP Instance UIDs to be successfully archived. The STORAGE-SCP AE does not require the Composite SOP Instances to actually be successfully written to archive media in order to commit to responsibility for maintaining these SOP Instances.

Once the STORAGE-SCP AE has checked for the existence of the specified Composite SOP Instances, it will then attempt to send the Notification request (N-EVENT-REPORT-RQ). The default behavior is to attempt to send this Notification over the new Association that was used by the peer AE to send the original N-ACTION Request.

The STORAGE-SCP AE will not cache Storage Commitment Push Model N-ACTION Requests that specify Composite SOP Instances that have not yet been transferred to the product. If a peer AE sends a Storage Commitment Push Model N-ACTION Request before the specified Composite SOP Instances are later sent over the same Association, the STORAGE-SCP AE will not commit to responsibility for such SOP Instances.

The STORAGE-SCP AE does not support the optional Storage Media File-Set ID & UID attributes in the N-ACTION.

This product never automatically deletes Composite SOP Instances from the archive. The absolute persistence of SOP Instances and the maximum archiving capacity for such SOP Instances is dependent on the archiving media and capacity used by the product and is dependent on the actual specifications of the purchased system. It is necessary to check the actual system specifications to determine these characteristics.

The STORAGE-SCP AE will support Storage Commitment Push Model requests for SOP Instances of any of the Storage SOP Classes that are also supported by the STORAGE-SCP AE:

Table 4.2-37
SUPPORTED REFERENCED SOP CLASSES IN STORAGE COMMITMENT PUSH MODEL N-ACTION REQUESTS

Supported Referenced SOP Classes
Computed Radiography Image Storage
Digital X-Ray Image Storage - For Presentation
Digital Mammography X-Ray Image Storage - For Presentation
Digital Intra-oral X-Ray Image Storage - For Presentation
CT Image Storage
Enhanced CT Image Storage
US Multi-frame Image Storage
MR Image Storage
Enhanced MR Image Storage
US Image Storage
Enhanced US Volume Storage
Secondary Capture Image Storage
Multi-frame Grayscale Byte Secondary Capture Image Storage
Multi-frame True Color Secondary Capture Image Storage
Grayscale Softcopy Presentation State Storage
Grayscale Planar MPR Volumetric Presentation State Storage
XA Image Storage
RF Image Storage
X-Ray 3D Angiographic Image Storage
Breast Tomosynthesis Image Storage
Breast Projection X-Ray Image Storage - For Presentation
IVOCT Image Storage - For Presentation
IVOCT Image Storage - For Processing
NM Image Storage
Spatial Fiducials Storage
VL Endoscopic Image Storage
VL Photographic Image Storage
Basic Text SR Storage
Enhanced SR Storage
Comprehensive SR Storage
Mammography CAD SR Storage
Key Object Selection Document
X-Ray Radiation Dose SR Storage

Supported Referenced SOP Classes
Encapsulated PDF Storage
PET Image Storage
RT Image Storage
RT Dose Storage
RT Structure Set Storage
RT Beams Treatment Record Storage
RT Plan Storage
RT Treatment Summary Record Storage
Toshiba US Private Data Storage
MI 3D Softcopy Presentation State

The STORAGE-SCP AE will return the following Status Code values in N-ACTION Responses:

Table 4.2-38
STORAGE-SCP AE STORAGE COMMITMENT PUSH MODEL N-ACTION RESPONSE STATUS RETURN BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has successfully received the Storage Commitment Push Model N-ACTION Request and can process the commitment request for the indicated SOP Instances.
*	*	Any other status code	This is treated as a permanent Failure. Error indication message is output to the Service Logs. No message is posted to the User .

The STORAGE-SCP AE will exhibit the following Behavior according to the Status Code value returned in an N-EVENT-REPORT Response from a destination Storage Commitment Push Model SCU:

Table 4.2-39
STORAGE-SCP AE N-EVENT-REPORT RESPONSE STATUS HANDLING BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCU has successfully received the Storage Commitment Push Model N-EVENT-REPORT Request. Success indication message is output to the Service Logs. No message is posted to the User Interface.
*	*	Any other status code.	This is treated as a permanent Failure. Error indication message is output to the Service Logs. No message is posted to the User Interface.

All Status Codes indicating an error or refusal are treated as a permanent failure. The STORAGE-SCP AE can be configured to automatically reattempt the sending of Storage Commitment Push Model N-EVENT-REPORT Requests if an error Status Code is returned or a communication failure occurs. The maximum number of times to attempt sending as well as the time to wait between attempts is configurable.

Table 4.2-40
STORAGE-SCP AE STORAGE COMMITMENT PUSH MODEL
COMMUNICATION FAILURE BEHAVIOR

Exception	Behavior
Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. The STORAGE-SCP AE is waiting for the next N-ACTION Request on an open Association but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. If some Composite SOP Instances have been successfully received over the same Association via the Storage Service then they are maintained in the database. They are not automatically discarded because of a later Storage Commitment messaging failure. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is output to the Service Logs. No message is posted to the User Interface.
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout). I.e. The STORAGE-SCP AE is waiting for the next N-EVENT-REPORT Response on an open Association but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. If some Composite SOP Instances have been successfully received over the same Association via the Storage Service then they are maintained in the database. They are not automatically discarded because of a later Storage Commitment messaging failure. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is output to the Service Logs. No message is posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	The Association is aborted by issuing a DICOM A-ABORT. If some Composite SOP Instances have been successfully received over the same Association via the Storage Service then they are maintained in the database. They are not automatically discarded because of a later Storage Commitment messaging failure. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is output to the Service Logs. No message is posted to the User Interface.
Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	The TCP/IP socket is closed. If some Composite SOP Instances have been successfully received over the same Association via the Storage Service then they are maintained in the database. They are not automatically discarded because of a later Storage Commitment messaging failure. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is output to the Service Logs. No message is posted to the User Interface.

4.2.5. MODALITY-WORKLIST-QUERY-SCP AE Specification

4.2.5.1. SOP Classes

The MODALITY-WORKLIST-QUERY-SCP AE provides Standard Conformance to the following SOP Classes:

Table 4.2-41
SOP CLASSES FOR MODALITY-WORKLIST-QUERY-SCP AE

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist	1.2.840.10008.5.1.4.31	No	Yes

4.2.5.2. Association Policies

4.2.5.2.1. General

The DICOM standard Application Context Name for DICOM 3.0 is always accepted:

Table 4.2-42
DICOM APPLICATION CONTEXT FOR MODALITY-WORKLIST-QUERY-SCP AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.5.2.2. Number of Associations

The MODALITY-WORKLIST-QUERY-SCP AE can support up to 4 Associations at a time.

Table 4.2-43
NUMBER OF SIMULTANEOUS ASSOCIATIONS AS A SCP FOR MODALITY-WORKLIST-QUERY-SCP AE

Maximum number of simultaneous Associations	4(Configurable)

4.2.5.2.3. Asynchronous Nature

The MODALITY-WORKLIST-QUERY-SCP AE does not support asynchronous communication (multiple outstanding transactions over a single Association). All Association requests must be completed and acknowledged before a new operation can be initiated.

Table 4.2-44
ASYNCHRONOUS NATURE AS A SCP FOR MODALITY-WORKLIST-QUERY-SCP AE

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

4.2.5.2.4. Implementation Identifying Information

The implementation information for the AE is:

Table 4.2-45
DICOM IMPLEMENTATION CLASS AND VERSION FOR MODALITY-WORKLIST-QUERY-SCP AE

Implementation Class UID	1.2.392.200036.9116.7.28.1
Implementation Version Name	CM_OT_TFS01_1.0

4.2.5.3. Association Initiation Policy

The MODALITY-WORKLIST-QUERY-SCP AE does not initiate Associations.

4.2.5.4. Association Acceptance Policy

4.2.5.4.1. Activity – Handling Modality Worklist Query Requests

4.2.5.4.1.1. Description and Sequencing of Activity

The MODALITY-WORKLIST-QUERY-SCP AE accepts Associations only if they have valid Presentation Contexts. If none of the requested Presentation Contexts are accepted then the Association Request itself is rejected. It can be configured to only accept Associations with certain hosts (using TCP/IP address) and/or AE Titles.

If MODALITY-WORKLIST-QUERY-SCP AE receives a query (MWL C-FIND) request then the response(s) will be sent over the same Association used to send the MWL C-FIND-Request.

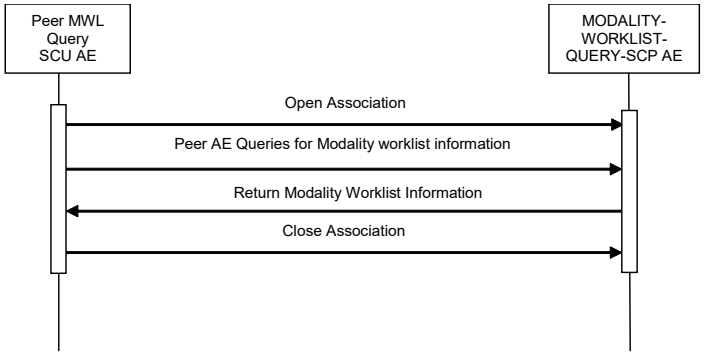

Figure 4.2-5
SEQUENCING OF ACTIVITY – HANDLING MWL QUERY REQUESTS

The following sequencing constraints illustrated in Figure 4.2-3 apply to the MODALITY-WORKLIST-QUERY-SCP AE for handling queries (MWL C-FIND-Requests):

1. Peer AE opens an Association with the MODALITY-WORKLIST-QUERY-SCP AE.
2. Peer AE sends a MWL C-FIND-RQ Message
3. MODALITY-WORKLIST-QUERY-SCP AE returns a MWL C-FIND-RSP Message to the peer AE with matching information. A MWL C-FIND-RSP is sent for each entity matching the identifier specified in the MWL C-FIND-RQ. A final MWL C-FIND-RSP is sent indicating that the matching is complete.
4. Peer AE closes the Association. Note that the peer AE does not have to close the Association immediately. Further MWL C-FIND Requests can be sent over the Association before it is closed.

The MODALITY-WORKLIST-QUERY-SCP AE may reject Association attempts as shown in the table below. The Result, Source and Reason/Diag columns represent the values returned in the corresponding fields of an ASSOCIATE-RJ PDU (see PS 3.8, Section 9.3.4). The following abbreviations are used in the Source column:

a – DICOM UL service-user

b – DICOM UL service-provider (ACSE related function)

c – DICOM UL service-provider (Presentation related function)

Table 4.2-46
ASSOCIATION REJECTION REASONS

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
2 – rejected-transient	c	1 – temporary-congestion	Out of System resources.
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.

4.2.5.4.1.2. Accepted Presentation Contexts

MODALITY-WORKLIST-QUERY-SCP AE will accept Presentation Contexts as shown in the following table:

Table 4.2-47
ACCEPTED PRESENTATION CONTEXTS BY THE MODALITY-WORKLIST-QUERY-SCP AE

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Verification	1.2.840.10008.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

4.2.5.4.1.3. SOP Specific Conformance for Modality Worklist SOP Classes

The MODALITY-WORKLIST-QUERY-SCP AE supports matching on the following elements.

Table 4.2-48
MODALITY-WORKLIST-QUERY SCP AE SUPPORTED MATCHING KEY ELEMENTS

Description / Module	Tag	Matching Key Type	Matching Type
Scheduled Procedure Step Module			
Scheduled Procedure Step Sequence	(0040,0100)	Required	Sequence Matching.
>Scheduled station AE title	(0040,0001)	Required	Single Value Matching Only.
>Scheduled Procedure Step Start Date	(0040,0002)	Required	Single Value Matching or Range Matching.
>Scheduled Procedure Step Start Time	(0040,0003)	Required	Single Value Matching or Range Matching.
>Modality	(0008,0060)	Required	Single Value Matching.
Patient Identification Module			
Patient's Name	(0010,0010)	Required	Single Value Matching or Wild Card Matching.
Patient ID	(0010,0020)	Required	Single Value Matching

Notes : Patient's Name in MODALITY-WORKLIST-QUERY SCP is case-sensitive.

The Range Matching only support the following conditions.
A string of the form "<date1> - <date2>", where <date1> is less or equal to <date2>.
A string of the form "<time1> - <time2>", where <time1> is less or equal to <time2>.

The MODALITY-WORKLIST-QUERY-SCP AE supports the following elements as return key attributes.

Table 4.2-49
MODALITY WORKLIST C-FIND SCP AE SUPPORTED RETURN KEY ELEMENTS

Description / Module	Tag	Return Key Type	Presence of Value
SOP Common			
Specific Character Set	(0008,0005)	1C	This attribute is required if expanded or replacement character sets are used.
Patient Identification Module			
Patient’s Name	(0010,0010)	1	Always Set
Patient ID	(0010,0020)	1	Always Set
Patient Demographic Module			
Patients Birth Date	(0010,0030)	2	Length=0 when no entry is made
Patient's Sex	(0010,0040)	2	Length=0 when no entry is made
Patient's Weight	(0010,1030)	2	Length=0 when no entry is made
Patient Medical Module			
Medical Alerts	(0010,2000)	2	Always Set Length=0

Description / Module	Tag	Return Key Type	Presence of Value
Pregnancy Status	(0010,21C0)	2	Length=0 when no entry is made
Scheduled Procedure Step Module			
Scheduled Procedure Step Sequence	(0040,0100)	1	Always Set
>Modality	(0008,0060)	1	Always Set
>Scheduled Station AE Title	(0040,0001)	1	Always Set
>Scheduled Procedure Step Start Date	(0040,0002)	1	Always Set
>Scheduled Procedure Step Start Time	(0040,0003)	1	Always Set
>Scheduled Performing Physician's Name	(0040,0006)	2	Length=0 when no entry is made
>Scheduled Procedure Step Description	(0040,0007)	1C	Either The Scheduled Procedure Step Description(0040,0007) or The Scheduled Action Item Code Sequence(0040,0008) or Both Always Set.
>Scheduled Procedure Step ID	(0040,0009)	1	Always Set
>Scheduled Station Name	(0040,0010)	2	Length=0 when no entry is made
>Scheduled Procedure Step Location	(0040,0011)	2	Length=0 when no entry is made
Requested Procedure Module			
Requested Procedure ID	(0040,1001)	1	Always Set
Requested Procedure Code Sequence	(0032,1064)	1C	Either the Requested Procedure Description (0032,1060) or the Requested Procedure Code Sequence (0032,1064) or both always set.
>Code Value	(0008,0100)	1C	Always set if a Sequence Item is present.
>Coding Scheme Designator	(0008,0102)	1C	Always set if a Sequence Item is present.
>Coding Scheme Version	(0008,0103)	3	Length=0 when no entry is made
>Code Meaning	(0008,0104)	3	Length=0 when no entry is made
Requested Procedure Description	(0032,1060)	1C	Either the Requested Procedure Description (0032,1060) or the Requested Procedure Code Sequence (0032,1064) or both always set.
Study Instance UID	(0020,000D)	1	Always Set
Imaging Service Request Module			
Accession Number	(0008,0050)	2	Always Set

Description / Module	Tag	Return Key Type	Presence of Value
Requesting Physician	(0032,1032)	2	Length=0 when no entry is made
Referring Physician's Name	(0008,0090)	2	Always Set Length=0
Requesting Service	(0032,1033)	3	Not Set when no entry is made
Visit Identification			
Admission ID	(0038,0010)	2	Always Set

Table 4.2-50
MODALITY-WORKLIST-QUERY-SCP AE C-FIND RESPONSE STATUS RETURN BEHAVIOR

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	Matching is complete. No final identifier is supplied.
Refused	Out of Resources	A700	Out of System resources.
Failed	Identifier does not match SOP Class	A900	The C-FIND query identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class. Error message is output to the Service Log.
	Unable to process	Cxxx	The C-FIND query identifier is valid for the specified SOP Class but cannot be used to query the database. Error message is output to the Service Log.
Canceled	Matching terminated due to cancel request	FE00	This status is returned if a Cancel Request is received from the SCU during the processing of a Modality Worklist request. The response status code and meaning are logged in the Service Log.
Pending	Matches are continuing	FF00	The status is returned with each matching response.
	Matching is continuing – Current match is supplied and any optional keys were supported in the same matter as required keys	FF01	The status is returned with each matching response if one or more optional matching or return keys are not supported for existence.

4.2.6. QUERY-RETRIEVE-SCU AE Specification

4.2.6.1. SOP Classes

The QUERY-RETRIEVE-SCU AE provides Standard Conformance to the following SOP Classes:

Table 4.2-51
SOP CLASSES FOR THE QUERY-RETRIEVE-SCU AE

SOP Class Name	SOP Class UID	SCU	SCP
Study Root Q/R Information Model – Find	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Study Root Q/R Information Model – Move	1.2.840.10008.5.1.4.1.2.2.2		

4.2.6.2. Association Policies

4.2.6.2.1. General

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

Table 4.2-52
DICOM APPLICATION CONTEXT FOR THE QUERY-RETRIEVE-SCU AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.6.2.2. Number of Associations

The QUERY-RETRIEVE-SCU AE can initiate up to three associations at a time.

Table 4.2-53
NUMBER OF ASSOCIATIONS INITIATED FOR THE QUERY-RETRIEVE-SCU AE

Maximum number of simultaneous associations	3

4.2.6.2.3. Asynchronous Nature

The QUERY-RETRIEVE-SCU AE does not support asynchronous communication (multiple outstanding transactions over a single association).

Table 4.2-54
ASYNCHRONOUS NATURE FOR THE Q/R SCU AE

Maximum number of outstanding asynchronous transactions	1

4.2.6.2.4. Implementation Identifying Information

The implementation information for this Application Entity is:

Table 4.2-55
DICOM IMPLEMENTATION CLASS AND VERSION FOR THE QUERY-RETRIEVE-SCU AE

Implementation Class UID	1.2.392.200036.9116.7.28.1
Implementation Version Name	CM_OT_TFS01_1.0

4.2.6.3. Association Initiation Policy

4.2.6.3.1. Activity – Query and Retrieve Images

4.2.6.3.1.1. Description and Sequencing of Activities

The QUERY-RETRIEVE-SCU AE is activated when the user selects a remote node to query and enters some key information, Patient's Name, Patient ID, Modalities in Study and/or Study Date. The user can select studies, series and images to be retrieved. The images will be received at the STORAGE-SCP AE.

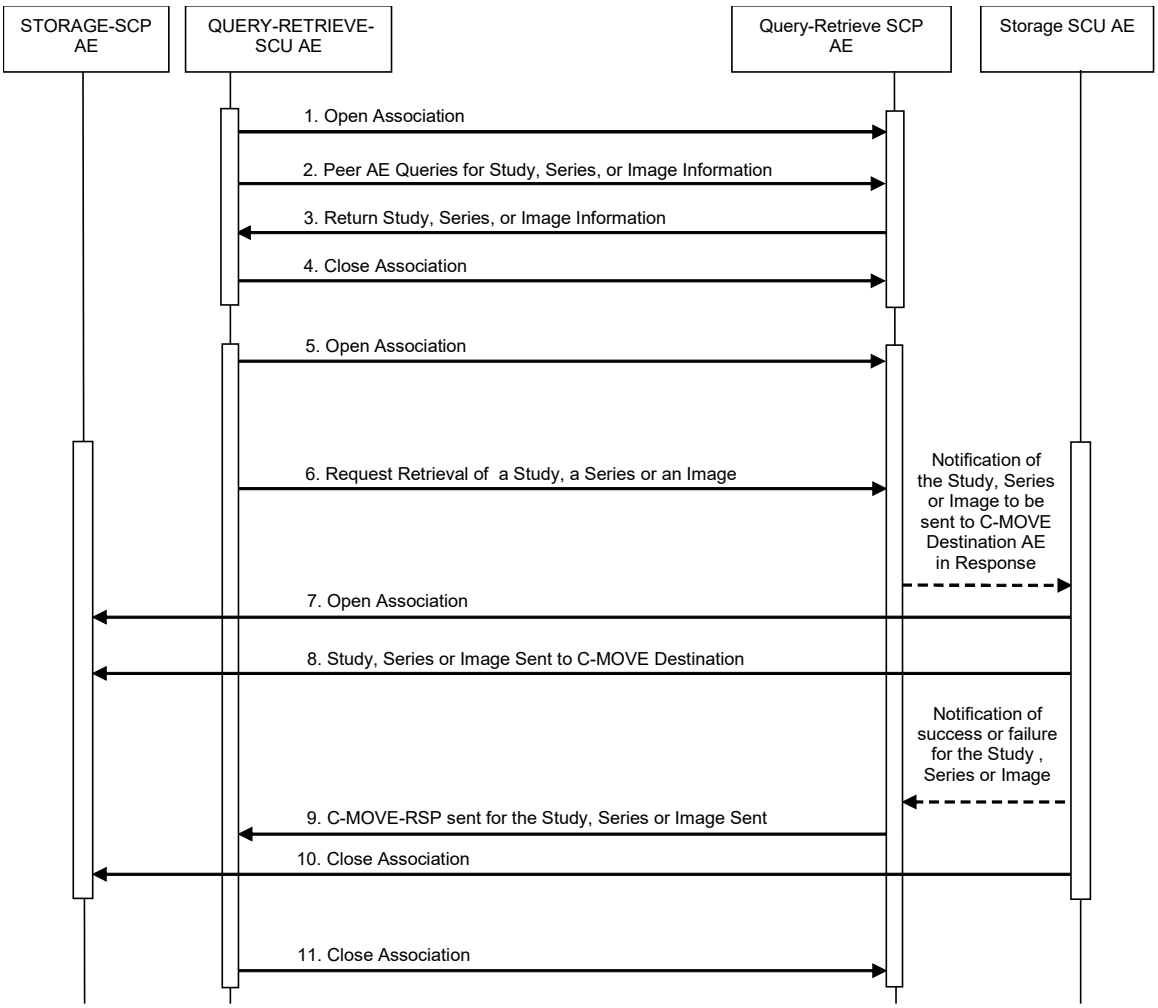

Figure 4.2-6
SEQUENCING OF ACTIVITY – QUERY AND RETRIEVE IMAGES

The following sequencing constraints illustrated in the Figure above:

1. The QUERY-RETRIEVE-SCU AE opens an association with the Query-Retrieve SCP AE.
2. The QUERY-RETRIEVE-SCU AE sends a C-FIND-RQ Message
3. The Query-Retrieve SCP AE returns a C-FIND-RSP Message to the QUERY-RETRIEVE-SCU AE with matching information.
   A C-FIND-RSP is sent for each entity matching the identifier specified in the C-FIND-RQ. A final C-FIND-RSP is sent indicating that the matching is complete.
4. The QUERY-RETRIEVE-SCU AE closes the association.
5. The QUERY-RETRIEVE-SCU AE opens an association with the Query-Retrieve SCP AE.
6. The QUERY-RETRIEVE-SCU AE sends a C-MOVE-RQ Message. The Query-Retrieve SCP AE notifies the Storage SCU AE to send the Composite SOP Instances to the peer C-MOVE Destination AE as indicated in the C-MOVE-RQ.
7. The Storage SCU AE opens an association with the C-MOVE Destination AE.
8. The Storage SCU AE sends images to the C-MOVE Destination AE. The Storage SCU AE indicates to the Query-Retrieve SCP AE whether the transfer succeeded or failed.
9. The Query-Retrieve SCP AE then returns a C-MOVE-RSP indicating this success or failure.
10. The Storage SCU AE closes the association.
11. The QUERY-RETRIEVE-SCU AE closes the association.

4.2.6.3.1.2. Proposed Presentation Contexts

The QUERY-RETRIEVE-SCU AE will propose Presentation Contexts shown in the following table:

Table 4.2-56
PROPOSED PRESENTATION CONTEXTS FOR REAL-WORLD ACTIVITY QUERY AND RETRIEVE IMAGES

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name List**	**UID List**		
Study Root Q/R Information Model – Find	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Study Root Q/R Information Model – Move	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

4.2.6.3.1.3. SOP Specific Conformance for Q/R Find SOP Classes

The QUERY-RETRIEVE-SCU AE provides standard conformance to the Query/Retrieve Find SOP Classes as an SCU.

The behavior of the QUERY-RETRIEVE-SCU AE when encountering status codes in a Q/R C-FIND response is summarized in the table below:

Table 4.2-57
THE QUERY-RETRIEVE-SCU AE C-FIND RESPONSE STATUS BEHAVIOR

Service Status	Further Meaning	Status 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 and the worklist query is marked as failed. The status meaning is logged and reported to the user.
Failed	Identifier does not match SOP Class	A900	
Failed	Unable to Process	Cxxx	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.
Cancel	Matching terminated due to Cancel request	FE00	
Pending	Matches are continuing	FF00	
Pending	Matches are continuing – Warning that one or more Optional Keys were not supported	FF01	
*	*	Any other status code	

The behavior of the QUERY-RETRIEVE-SCU AE during communication failure is summarized in the table below.

Table 4.2-58
Q/R FIND COMMUNICATION FAILURE BEHAVIOR

Exception	Behavior
Timeout	The association is aborted and the study, series or image query is marked as failed. The reason is logged and reported to the user.
Association aborted by the SCP or network layers	The study, series or image query is marked as failed. The reason is logged and reported to the user.

The table below provides a description of the QUERY-RETRIEVE-SCU AE C-FIND Request Identifier.

Table 4.2-59
STUDY ROOT REQUEST IDENTIFIER FOR C-FIND

Name	Tag	Types of Matching
Study Level		
Study Date	(0008,0020)	S,U,R
Study Time	(0008,0030)	U
Accession Number	(0008,0050)	S,U,*
Modality	(0008,0060)	U
Modalities in Study	(0008,0061)	S,U,L
Referring Physician's Name	(0008,0090)	U
Station Name	(0008,1010)	U
Study Description	(0008,1030)	S,U,*
Patient's Name	(0010,0010)	S,U,*
Patient's ID	(0010,0020)	S,U,*
Patient's Birth Date	(0010,0030)	U
Patient's Sex	(0010,0040)	U
Patient Comment	(0010,4000)	U
Body Part Examined	(0018,0015)	U
Study Instance UID	(0020,000D)	U
Study ID	(0020,0010)	U
Number of Study Related Series	(0020,1206)	U
Number of Study Related Instances	(0020,1208)	U
Series Level		
Study Date	(0008,0020)	U
Series Date	(0008,0021)	U
Series Time	(0008,0031)	U
Accession Number	(0008,0050)	U
Modality	(0008,0060)	U
Modalities in Study	(0008,0061)	U
Manufacturer	(0008,0070)	U
Station Name	(0008,1010)	U
Study Description	(0008,1030)	U
Series Description	(0008,103E)	U
Manufacturer's Model Name	(0008,1090)	U

Name	Tag	Types of Matching
Patient’s Name	(0010,0010)	U
Patient ID	(0010,0020)	U
Patient’s Birth Date	(0010,0030)	U
Patient’s Sex	(0010,0040)	U
Body Part Examined	(0018,0015)	U
Study Instance UID	(0020,000D)	UNIQUE
Series Instance UID	(0020,000E)	U
Study ID	(0020,0010)	U
Series Number	(0020,0011)	U
Number of Study Related Instances	(0020,1208)	U
Number of Series Related Instances	(0020,1209)	U
Image Level		
Image Type	(0008,0008)	U
SOP Class UID	(0008,0016)	U
SOP Instance UID	(0008,0018)	U
Study Date	(0008,0020)	U
Series Date	(0008,0021)	U
Content Date	(0008,0023)	U
Content Time	(0008,0033)	U
Patient’s Birth Date	(0010,0030)	U
Study Instance UID	(0020,000D)	UNIQUE
Series Instance UID	(0020,000E)	UNIQUE
Instance Number	(0020,0013)	U
Image Comments	(0020,4000)	U
Number of Frames	(0028,0008)	U
Rows	(0028,0010)	U
Columns	(0028,0011)	U
Bits Allocated	(0028,0100)	U

Types of Matching:

The types of Matching supported by the QUERY-RETRIEVE-SCU AE.
A "S" indicates the identifier attribute uses single value matching, a “R” indicates range matching,
a “*” indicates wildcard matching, a ‘L’ indicates list matching and a ‘U’ indicates universal matching.
“UNIQUE” indicates that this is the Unique Key for that query level,
in which case universal matching or single value matching is used depending on the query level.

4.2.6.3.1.4. SOP Specific Conformance for Q/R Move SOP Classes

The QUERY-RETRIEVE-SCU AE provides standard conformance to the Query/Retrieve Move SOP Classes as an SCU.

The behavior of the QUERY-RETRIEVE-SCU AE when encountering status codes in a Q/R C-MOVE response is summarized in the table below:

Table 4.2-60
THE QUERY-RETRIEVE-SCU AE C-MOVE RESPONSE STATUS BEHAVIOR

Service Status	Further Meaning	Status Code	Behavior
Success	Sub-operations complete – No Failures	0000	The STORAGE-SCP AE has successfully received the SOP Instance. If all SOP Instances in a move job have status success then the job is marked as complete.
Refused	Out of Resources – Unable to calculate number of matches	A701	The association is aborted using A-ABORT and the move job is marked as failed. The status meaning is logged and the job failure is reported to the user via the job control application.
	Out of Resources – Unable to perform sub-operations	A702	
	Move destination unknown	A801	
Failed	Identifier does not match SOP Class	A900	
Warning	Sub-operations complete but one or more failures.	B000	The association is aborted and the move job is marked as failed. The status meaning is logged and the job failure is reported to the user via the job control application.

The behavior of the QUERY-RETRIEVE-SCU AE during communication failure is summarized in the table below.

Table 4.2-61
Q/R MOVE COMMUNICATION FAILURE BEHAVIOR

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the retrieve is 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 retrieve is marked as failed. The reason is logged and reported to the user if an interactive query.

4.2.6.4. Association Acceptance Policy

The QUERY-RETRIEVE-SCU AE does not accept associations.

4.2.7. WADO-URI Service AE Specifications

4.2.7.1. WADO-URI Retrieve Imaging Document Set

WADO-URI Retrieve Image Document Set Parameter Specification is below.

Table 4.2-62
WADO-URI Retrieve Imaging Document Set Specification

Parameter	Restrictions
Transfer Syntaxes Supported	Please refer to Table 4.2-35 for supported Transfer Syntaxes. If Transfer Syntax does not specify or dose not matched stored instance in the system, will be responded by the explicit VR Little Endian Transfer Syntax. If a proposed transfer syntax is matched the stored instance, will be responded by that transfer syntaxes. If specified Transfer-Syntax=”*”, will be responded by transfer syntax of stored instance.
SOP Class Restrictions	Please refer to Table 4.2-35 for supported SOP Class.
Size restriction	Uncompressed DICOM image pixel data has a maximum size of 2G bytes.
Anonymization	Not supported.
StudyUID	Study instance UID is mandatory
SeriesUID	Series instance UID is mandatory
ObjectUID	SOP instance UID is mandatory
ContentType	Please refer to Table 4.2-64.

If the URI Retrieve specifies no transfer syntax that is supported by the system, the SOP Instance will be returned using the Explicit VR Little Endian Transfer Syntax

4.2.7.2. WADO-URI Retrieve Rendered Imaging Document Set

WADO-URI Retrieve Image Document Set Specification is below.

Table 4.2-63
WADO-URI Retrieve Rendered Imaging Document Set Specification

Parameter	Restrictions
Transfer Syntaxes Supported	Please refer to Table 4.2-35 If Transfer Syntax does not specify or dose not matched stored instance in the system, will be responded by the explicit VR Little Endian Transfer Syntax. If a proposed transfer syntax is matched the stored instance, will be responded by that transfer syntaxes. If specified Transfer-Syntax="*", will be responded by transfer syntax of stored instance.
SOP Class Restrictions	Please refer to Table 4.2-35
Size restriction	Uncompressed DICOM image pixel data has a maximum size of 2G bytes.
StudyUID	Study instance UID is mandatory
SeriesUID	Series instance UID is mandatory
ObjectUID	SOP instance UID is mandatory
ContentType	Please refer to Table 4.2-64.
Rendered formats available	Please refer to Table 4.2-64.
Compression available	Please refer to Table 4.2-64.
ImageQuality	Compression rate for image/jpeg. Must be in range 1 – 100. Default is 70.
FrameNumber	The frame number of image that will be returned. Must be greater than 1. Default is the image in the middle.
Image Annotation	Not supported
Rows	Must be in greater than 1. Default is original image value.
Columns	Must be in greater than 1. Default is original image value.
Region	A value will be ordered by "Left, Top, Right, Bottom "and will be specified as a percentage. Default returns the entire image.
WindowCenter	Default is original image value.
WindowWidth	Must be greater than 2. Default is original image value.
Anonymize	Not supported
Other restrictions	None

4.2.7.3. WADO-URI Retrieve ContentType

WADO-URI Retrieve Image ContentType is below.

Table 4.2-64
WADO-URI Retrieve ContentType

MediaType	SingleFrame Image	MultiFrame image
Application/DICOM	The DICOM Image will be returned.	The DICOM Image will be returned.
Image/Jpeg	The jpeg Image will be returned.	The jpeg Image of specified frame by FrameNumber of parameter will be returned. The middle image will be returned If parameter is not specified.
Image/Png	The png image will be returned.	The png Image of specified frame by FrameNumber of parameter will be returned. The middle image will be returned If parameter is not specified.
Image/Jp2	The jp2 Image will be returned.	The jp2 Image of specified frame by FrameNumber of parameter will be returned. The middle image will be returned If parameter is not specified.
Image/Gif	The gif image will be returned,	The gif Image of specified frame by FrameNumber of parameter will be returned. all frames in the image will be returned If parameter is not specified.

4.2.7.4. WADO-URI Retrieve Imaging Document Set Metadata

Not supported.

4.2.7.5. Connection Policies

4.2.7.5.1. General

All URI connections are limited to HTTP GET requests. The WADO-URI Service ignores all unknown HTTP header parameters.

4.2.7.5.2. Number of Connections

Table 4.2-65
Number of HTTP Requests Supported

Maximum number of simultaneous HTTP requests	5

4.2.7.5.3. Asynchronous Nature

The WADO-URI Service does not support RS asynchronous response.

4.2.7.5.4. Request Target Resource

Table 4.2-66
WADO-URI Retrieve Target Resource

Target Resource	Resource Template
Base	http://*{host}*/VNDMIF/WADO?*{Parameters}*

4.2.7.5.5. Response status code

WADO-URI response status code is below.

Table 4.2-67
WADO-URI response status code

Service Status	Further Meaning	Status Code	Description
Success	OK – No Failures	200	The query completed and a matching instance is returned in the payload.
Failure	Bad Request	400	This indicates that the WADO-URI provider was unable to fulfill it because it cannot understand the query component.
Warning	Not found	404	This indicates that WADO-URI provider did not find a representation for the target resource.
Warning	Offline	410	This indicates that the WADO-URI cannot access the target resource due to offline.
Failure	Internal Failure.	500	This indicates that the WADO-URI provider was unable to fulfill it due to internal failure.

4.2.8. WADO-RS Service AE Specifications

4.2.8.1. WADO-RS Retrieve Study

Table 4.2-68
WADO-RS Retrieve DICOM

Option	Restrictions
Data Types Supported (Accept type)	Restricted to Application/dicom or application/octet-stream.
Transfer Syntaxes Supported (transfer-syntax Accept parameter)	Please refer to Table 4.2-35. If Transfer Syntax does not specify or dose not match stored instance in the system, will be responded by the explicit VR Little Endian Transfer Syntax. If a proposed transfer syntax is matched the stored instance, will be responded by that transfer syntaxes. If specified Transfer-Syntax=”*”, will be responded by transfer syntax of stored instance.
Size Restriction	Uncompressed DICOM image pixel data has a maximum size of 2G bytes.
SOP Class Restrictions	Please refer to Table 4.2-35

The Study level retrieve does not support the request type that is BulkData PixelData and Rendered.

4.2.8.2. WADO-RS Retrieve Series

Please refer to Table 4.2-68

The Series level retrieve does not support the request type that is BulkData, PixelData and Rendered.

4.2.8.3. WADO-RS Retrieve Instance

Please refer to Table 4.2-68

4.2.8.4. WADO-RS Retrieve Frames

Please refer to Table 4.2-68

The Frame level retrieve is restricted to the Request Type that is BulkData, PixelData or Rendered.

4.2.8.5. WADO-RS Retrieve Bulk Data

Table 4.2-69
WADO-RS Retrieve Bulk Data

Option	Restrictions
Data Types Supported (Accept type)	Restricted to application/octet-stream.
Transfer Syntaxes Supported (transfer-syntax Accept parameter)	Please refer to Table 4.2-35. If Transfer Syntax does not specify or dose not match stored instance in the system, will be responded by the Explicit VR Little Endian Transfer Syntax. If a proposed transfer syntax is matched the stored instance, will be responded by that transfer syntaxes. If specified Transfer-Syntax=”*”, will be responded by transfer syntax of stored instance.
Size Restriction	Uncompressed DICOM image pixel data has a maximum size of 2G bytes.
SOP Class Restrictions	Please refer to Table 4.2-35

WADO-RS Retrieve BulkData does not support the Study and Series level retrieve.

4.2.8.6. WADO-RS Retrieve Pixel Data

Please refer to Table 4.2-69

WADO-RS Retrieve PixelData does not support the Study and Series level retrieve

4.2.8.7. WADO-RS Retrieve Metadata

Table 4.2-70
WADO-RS Retrieve Metadata

Option	Restrictions
Data Types Supported (Accept type)	Restricted to application/dicom+xml or application/dicom+json

WADO-RS Retrieve Metadata does not support the Frame level.

4.2.8.8. WADO-RS Retrieve Rendered

Table 4.2-71
WADO-RS Retrieve Rendered

Option	Restrictions
Data Types Supported (Accept type)	Restricted to image/jpeg, image/png, image/jp2 or image/gif
Size Restriction	Uncompressed DICOM image pixel data has a maximum size of 2G bytes.

WADO-RS Retrieve Rendered does not support the Study and Series level.

4.2.8.9. WADO-RS Retrieve Thumbnail

Table 4.2-72
WADO-RS Retrieve Thumbnail

Option	Restrictions
Data Types Supported (Accept type)	Restricted to image/jpeg, image/png, image/jp2 or image/gif

4.2.8.10. Connection Policies

4.2.8.10.1. General

All standard RS connection policies apply. There are no extensions for RS options.

4.2.8.10.2. Number of Connections

Table 4.2-73
Number of HTTP Requests Supported

Maximum number of simultaneous HTTP requests	5

4.2.8.10.3. Asynchronous Nature

The WADO-RS Service does not support RS asynchronous response.

4.2.8.10.4. Request Target Resource

Table 4.2-74
WADO-RS Retrieve Target Resource

Target Resource	Resource Template
Base	http://*{host}*/VNDMIF/WADO
Study Level	/Studies/{*StudyUID*}{*/RequestType*}
Series Level	/Studies/{*StudyUID*}/Series/{*SeriesUID*}{*/RequestType*}
Instance Level	/Studies/{*StudyUID*}/Series/{SeriesUID}/Instances/{SOPInstancesUID} {*/RequestType*}{*?Parameters*}
Frame Level	/Studies/{*StudyUID*}/Series/{SeriesUID}/Instances/{SOPInstancesUID} /Frames/{FrameNumber}{*/RequestType*}{*?Parameters*}

Table 4.2-75
WADO-RS Retrieve Request Query Parameter

Parameter	Acceptable Request type	Description
Accept type	Rendered / Thumbnail	Media Type: Please refer to Table 4.2-76 Restricted to image/jpeg, image/png, image/jp2 or image/gif
Quality	Rendered	Compression Rate of the image/jpeg. Specifying range in [1 to 100]. Default is 70
Viewport	Rendered / Thumbnail	Specifying a rectangular region of the source image to be cropped, and a rectangular region corresponding to the size. The syntax of parameter is viewport=vw, vh, sx, sy, sw, sh “vw” and “vh” are positive integers specifying the width and height, in pixels, of the rendered image. Both values are required. “sx”, “sy” are decimal numbers whose absolute values specify, in pixels, the top-left corner of the region of the source image to be rendered. If either “sx” or “sy” is not specified, it defaults to 0. A value of 0,0 specifies the top-left corner of the source image. “sw” and “sh” are decimal numbers whose absolute values specify, in pixels, the width and height of the region of the source image to be rendered. If sw is not specified, it defaults to the right edge of the source image. If sh is not specified, it defaults to the bottom edge of the source image. If sw is a negative value, the image is flipped horizontally. If sh is a negative value, the image is flipped vertically.
Window	Rendered	The "window" parameter controls the windowing of the images. The syntax of parameter is window= center, width, function “center” is decimal number containing the window-center value. “width” is decimal number containing the windows-width value. “function” is one keyword: “linear”

Table 4.2-76
THE WADO-RS Request Type

Request Type	Media Type	
	Single Part	**Multipart**
DICOM (No Specify)	application/dicom	multipart/related; type=application/dicom; transfer-syntax={*Transfer Syntax UID*} Each part in a multipart payload shall start with a boundary string, followed by a Content-Type header field with a single part media type
Metadata/XML	application/dicom+xml	multipart/related; type=application/dicom+xml; Each part in a multipart payload shall start with a boundary string, followed by a Content-Type header field with a single part media type
Metadata/JSON	application/dicom+json	multipart/related; type=application/dicom+json;
BulkData	application/octet-stream; transfersyntax={*Transfer Syntax UID*}	multipart/related; type=application/octet-stream; transfersyntax={*Transfer Syntax UID*} Each part in a multipart payload shall start with a boundary string, followed by a Content-Type header field with a single part media type
PixelData	application/octet-stream; transfersyntax={*Transfer Syntax UID*}	multipart/related; type=application/octet-stream; transfersyntax=*{Transfer Syntax UID}* Each part in a multipart payload shall start with a boundary string, followed by a Content-Type header field with a single part media type
Rendered	Specified Media Type by the accept parameter. If Media Type was not specified, returning due to “image/jpeg”.	Specified Media Type by the Accept header. If Media Type was not specified, returning due to “image/jpeg”. Each part in a multipart payload shall start with a boundary string, followed by a Content-Type header field with a single part media type.
Thumbnail	Specified Media Type by the accept parameter. If Media Type was not specified, returning due to “image/jpeg”.	Specified Media Type by the Accept header. If Media Type was not specified, returning due to “image/jpeg”.

4.2.8.10.5. Response Status Code

Table 4.2-77
WADO-RS response status code

Service Status	Further Meaning	Status Code	Description
Success	OK – No Failures	200	The query completed and a matching instance is returned in the payload.
Failure	Bad Request	400	This indicates that the WADO-RS provider was unable to fulfill it because it cannot understand the query component
Warning	Not found	404	This indicates that WADO-RS provider did not find a representation for the target resource
Warning	Not Acceptable.	406	This indicates that the WADO-RS provider was unable to fulfill because it cannot support specified media type.
Warning	Offline	410	This indicates that the WADO-RS provider was unable to access the target resource due to offline
Failure	Internal Failure.	500	This indicates that the WADO-RS provider was unable to fulfill it due to internal failure.

4.2.8.10.6. Response Header Filed

The Transfer-Encoding returns one keyword: “chunked”.

4.2.9. STOW-RS Service AE Specifications

4.2.9.1. STOW-RS Store Instance

Table 4.2-78
STOW-RS Instances Specification

Category	Restrictions
Media Type Supported (Accept header)	Restricted to application/dicom
SOP Class Restrictions	Please refer to Table 4.2-35
Size restriction	Uncompressed DICOM image pixel data has a maximum size of 2G bytes.
Transfer Syntaxes Supported (transfer-syntax Accept parameter)	Please refer to Table 4.2-35

4.2.9.2. Connection Policies

4.2.9.2.1. General

All standard RS connection policies apply. There are no extensions for RS options.

4.2.9.2.2. Number of Connections

Table 4.2-79
Number of HTTP Requests Supported

Maximum number of simultaneous RS requests	5

4.2.9.2.3. Asynchronous Nature

The STOW-RS Service does not support RS asynchronous response.

4.2.9.2.4. Request Target Resource

Table 4.2-80
STOW-RS Instance Target Resource

Target Resource	Resource Template
Base	http://[host]/VNDMIF/STOW
Study Level	/Studies/{*StudyUID*}

4.2.9.2.5. SOP Specific Conformance for SOP Class(Es)

The STOW-RS Service response message header contains status codes indicating success, warning, or failure as shown in the "HTTP Standard Response Codes" below. No additional status codes are used.

Table 4.2-81
HTTP Standard Response Codes

Service Status	Further Meaning	Status Code	Description
Success	OK – No Failures	200	This indicates that the STOW-RS Service successfully stored all the instances.
Warning	Accepted	202	This indicates that the STOW-RS Service stored some of the instances, but warnings or failures exist for others. Additional information regarding this error can be found in the XML response message body.
Failure	Bad Request	400	This indicates that the STOW-RS Service was unable to store any instances due to bad syntax.
Failure	Conflict	409	This indicates that the STOW-RS Service request was formed correctly but the service was unable to store any instances due to a conflict in the request (e.g., Study Instance UID mismatch). This may also be used to indicate that a STOW-RS Service was unable to store any instances for a mixture of reasons. Additional information regarding the instance errors can be found in the XML response message body.
Failure	Unsupported Media Type.	415	This indicates that the STOW-RS Service was unable to fulfill because it cannot support specified media type.
Failure	Internal Failure.	500	This indicates that the STOW-RS Service was unable to store any instances due to internal failure.

The STOW-RS Service response message body (PS3.18 XML Store Instances Response Module) contains the DICOM status codes for individual SOP Instances indicating success, warning, or failure as defined below. No additional status codes are used.

For the following semantics the associated values are used for the Warning Reason (0008,1196):

B000 Elements Discarded
The STOW-RS Service discarded some data elements during storage of the instance.

B006 Data Set does not match SOP Class
The STOW-RS Service discarded some data elements during storage of the instance.

B007 Data Set does not match SOP Class
The STOW-RS Service stored the instance despite the Data Set not matching the constraints of the SOP Class.

Additional codes may be used for the Warning Reason (0008,1196) to address the semantics of other issues.
In the event that multiple codes may apply, the single most appropriate code is used.
For the following semantics the associated value are used for the Failure Reason (0008,1197).

A700 Refused out of Resources
The STOW-RS Service did not store the instance because it was out of memory.

A710 Refused out of Resources
The STOW-RS Service did not store the instance because it was out of storage space.

A900 Error: Data Set does not match SOP Class
The STOW-RS Service did not store the instance because the SOP Class of an element in the Referenced SOP Instance Sequence did not correspond to the SOP class registered for this SOP Instance at the STOW-RS Service.

C000 Error: Cannot understand
The STOW-RS Service did not store the instance because it cannot understand certain Data Elements.

C122 Referenced Transfer Syntax not supported
The STOW-RS Service did not store the instance because it does not support the requested Transfer Syntax for the instance.

0110 Processing failure
The STOW-RS Service did not store the instance because of a general failure in processing the operation.

0122 Referenced SOP Class not supported
The STOW-RS Service did not store the instance because it does not support the requested SOP Class.

Additional codes may be used for the Failure Reason (0008,1197) to address the semantics of other errors.
In the event that multiple codes may apply, the single most appropriate code shall be used.

4.2.10. QIDO-RS Service AE Specifications

4.2.10.1. QIDO-RS Search for Studies

Table 4.2-82
QIDO-RS Search for Studies Specification

Parameter	Restrictions
Media Type Supported	Restricted to "multipart/related; type=application/dicom+xml" or "application/dicom+json"
Matching Attributes	See Table 4.2-83
Return Attributes	See Table 4.2-83
Limit and Offset supported	Yes
Person Name Matching	Literal, case insensitive. Section K.4.2.2 “Extended Negotiation”.

Table 4.2-83
QIDO-RS Study Attribute Matching

Keyword	Tag	Type of Matching
STUDY Level		
StudyDate	00080020	S,U,R
StudyTime	00080030	U
AccessionNumber	00080050	S,U
ModalitiesInStudy	00080061	U
InstitutionName	00080080	NONE
ReferringPhysicianName	00080090	S,U,*
StationName	00081010	NONE
StudyDescription	00081030	NONE
ManufacturerModelName	00081090	NONE
PatientName	00100010	S,U,*
PatientID	00100020	S,U,*
IssuerOfPatientID	00100021	NONE
PatientBirthDate	00100030	NONE
PatientSex	00100040	NONE
OtherPatientIDs	00101000	NONE
PatientAge	00101010	NONE
PatientComments	00104000	NONE
StudyInstanceUID	0020000D	U
StudyID	00200010	U
NumberOfStudyRelatedSeries	00201206	NONE
NumberOfStudyRelatedInstances	00201208	NONE
RequestingPhysician	00321032	NONE
RequestingService	00321033	NONE
RetrieveURL	00081190	NONE
Common to all query levels		
InstanceAvailability	00080056	NONE
TimezoneOffsetFromUTC	00080201	NONE

Types of Matching (see Section C.2.2.2 “Attribute Matching” in PS3.4):
"S" indicates the identifier attribute uses Single Value Matching
"U" indicates Universal Matching.

"*" indicates wild card matching
"R" indicates Range Matching
"NONE" indicates that no matching is supported, but that values for this Element requested will be returned with all requests

4.2.10.2. QIDO-RS Search for Series

Table 4.2-84
QIDO-RS Search for Series Specification

Parameter	Restrictions
Media Type Supported	Restricted to "multipart/related; type=application/dicom+xml" or "application/dicom+json"
Matching Attributes	See Table 4.2-85
Return Attributes	See Table 4.2-85
Limit and Offset supported	Yes
Relational Queries Supported	No

Table 4.2-85
QIDO-RS Series Attribute Matching

Keyword	Tag	Type of Matching
SERIES Level		
Modality	00080060	U
SeriesDate	00080021	NONE
SeriesTime	00080031	NONE
SeriesDescription	0008103E	NONE
BodyPartExamined	00180015	NONE
SeriesInstanceUID	0020000E	U
SeriesNumber	00200011	U
NumberOfSeriesRelatedInstances	00201209	NONE

4.2.10.3. QIDO-RS Search for Instances

Table 4.2-86
QIDO-RS Search for Instances Specification

Parameter	Restrictions
Media Type Supported	Restricted to "multipart/related; type=application/dicom+xml" or "application/dicom+json"
Matching Attributes	See Table 4.2-87
Return Attributes	See Table 4.2-87
Limit and Offset supported	Yes
Relational Queries Supported	No

Table 4.2-87
QIDO-RS Instance Attribute Matching

Keyword	Tag	Type of Matching
Instance Level		
ImageType	00080008	NONE
SOPClassUID	00080016	U
SOPInstanceUID	00080018	U
ContentDate	00080023	NONE
ContentTime	00080033	NONE
Modality	00080060	NONE
SliceThickness	00180050	NONE
ProtocolName	00181030	NONE
InstanceNumber	00200013	U
SliceLocation	00201041	NONE
ImageComments	00204000	NONE
PhotometricInterpretation	00280004	NONE
NumberOfFrames	00280008	NONE
Rows	00280010	NONE

4.2.10.4. Connection Policies

4.2.10.4.1. General

All standard RS connection policies apply. There are no extensions for RS options.

4.2.10.4.2. Number of Connections

The QIDO-Service limits the number of simultaneous RS requests. Additional requests will be queued after the HTTP connection is accepted. When an earlier request completes, a pending request will proceed.

Table 4.2-88
Number of HTTP Requests Supported

Maximum number of simultaneous HTTP requests	5

4.2.10.4.3. Asynchronous Nature

The QIDO-Service does not support RS asynchronous response.

4.2.10.4.4. Request Target Resource

Table 4.2-89
QIDO-RS Target Resource

Target Resource	Resource Template
Base	http://[host]/VNDMIF/QIDO
All Studies	/Studies?*{SearchStudyParameters}*
Study's Series	/Studies/{StudyUID}/Series?*{SearchSeriesParameters}*
Study's Instances	/Studies/{StudyUID}/instances?*{SearchInstanceParameters}*
All series	/Series?*{SearchStudyParameters}{SearchSeriesParameters}*
Study's Series' Instances	/Studies/*{StudyUID}*/Series/*{SeriesUID}*/Instances?*{SerchInstaneParameters}*
All Instances	/Instances/?*{SearchStudyParameters}{SearchSeriesParameters}* *{SearrchInstanceParameters}*

4.2.10.4.5. Response Status Code

Table 4.2-90
QIDO-RS response status code

Service Status	Further Meaning	Status Code	Description
Success	OK-No Failures	200	The query completed and any matching results are returned in the message body.
Warning	No Content	204	The search completed successfully, but there were zero results.
Warning	There are remaining results	299	There are remaining additional results that can be requested
Failure	Bad Request	400	This indicates that the QIDO-RS provider was unable to fulfill it because it cannot understand the query component.
Failure	Internal Failure.	500	This indicates that the QIDO-RS provider was unable to fulfill it due to internal failure.

4.2.10.4.6. Extended Negotiation

The QIDO-RS-service supports the "fuzzymatching" query key for PN VR attributes, but does not support other forms of fuzzy matching. This applies to the following attributes:
•Referring Physician's Name (0008,0090)
•Patient's Name (0010,0010)

4.3. NETWORK INTERFACES

4.3.1. Physical Network Interface

This product supports a single network interface. One of the following physical network interfaces will be available depending on installed hardware options:

Table 4.3-1
SUPPORTED PHYSICAL NETWORK INTERFACES

Ethernet 10GbaseT
Ethernet 1000baseT
Ethernet 100baseTX
Ethernet 10baseT

4.3.2. Additional Protocols

This product conforms to the System Management Profiles listed in Table 4.3-2. All requested transactions for the listed profiles and actors are supported. It does not support any optional transactions.

Table 4.3-2
SUPPORTED SYSTEM MANAGEMENT PROFILES

Profile Name	Actor	Protocols Used	Optional Transactions	Security Support
Network Address Management	DHCP Client	DHCP	N/A	None
	DNS Client	DNS	N/A	None

4.3.2.1. DHCP

DHCP can be used to obtain TCP/IP network configuration information. The network parameters obtainable via DHCP are shown in Table 4.3-3. The Default Value column of the table shows the default used if the DHCP server does not provide a value. Values for network parameters set in the Maintenance tool take precedence over values obtained from the DHCP server. Support for DHCP can be configured via the Maintenance Tool. The Maintenance tool can be used to configure the machine name. If DHCP is not in use, TCP/IP network configuration information can be manually configured via the Maintenance Tool.

Table 4.3-3
SUPPORTED DHCP PARAMETERS

DHCP Parameter	Default Value
IP Address	None
Hostname	Requested machine name
List of NTP servers	Empty list
List of DNS servers	Empty list
Routers	Empty list
Static routes	None
Domain name	None
Subnet mask	Derived from IP Address (see service manual)
Broadcast address	Derived from IP Address (see service manual)
Default router	None
Time offset	Site Configurable(from Time Zone)

DHCP Parameter	Default Value
MTU	Network Hardware Dependent
Auto-IP permission	No permission

If the DHCP server refuses to renew a lease on the assigned IP address all active DICOM Associations will be aborted.

4.3.2.2. DNS

DNS can be used for address resolution. If DHCP is not in use or the DHCP server does not return any DNS server addresses, the identity of a DNS server can be configured via the Maintenance Tool. If a DNS server is not in use, local mapping between hostname and IP address can be manually configured via the Maintenance Tool.

4.3.3. IPv4 and IPv6 Support

This product only supports IPv4 connections.

4.4. CONFIGURATION

4.4.1. AE Title/Presentation Address Mapping

4.4.1.1. Local AE Titles

The mapping from AE Title to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel.

Table 4.4-1
DEFAULT AE CHARACTERISTICS

AE	Role	Default AE Title	Default TCP/IP Port
STORAGE-SCU	SCU	CM_OT_TFS_01	Not Applicatable
STORAGE-SCP	SCP		104
QUERY-RETRIEVE-SCP	SCP		
ECHO-SCU	SCU		Not Applicatable
MODALITY-WORKLIST-QUERY-SCP	SCP		51001
QUERY-RETRIEVE-SCU	SCU		Not Applicatable

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4.4.1.2. Remote AE Title/Presentation Address Mapping

The AE Titles, host names and port numbers of remote applications are configured using the Service/Installation Tool.

4.4.2. Parameters

Table 4.4-2
CONFIGURATION PARAMETERS

Parameter	Configurable (Yes/No) [RANGE]	Default Value
General Parameters		
Maximum PDU size as a SCP	Yes [4096-6292594bytes]	6292594bytes
Maximum PDU size as a SCU	Yes [4096-6292594bytes]	6292594bytes
Time-out waiting for an acceptance or rejection response to an Association Request (Application Level Timeout)	Yes [1-600s]	15s
Time-out waiting for a response to an Association release request (Application Level Timeout)	Yes [1-600s]	15 s
Time-out waiting for completion of a TCP/IP connect request (Low-level timeout)	Yes [1-600s]	15s
Time-out awaiting a Response to a DIMSE Request (Low-Level Timeout)	Yes [1-600s]	15 s
Time-out for waiting for data between TCP/IP packets (Low Level Timeout)	Yes [1-600s]	90s
STORAGE-SCU AE Parameters		
Maximum number of simultaneous Associations.	Yes [1-32]	2
Supported Transfer Syntaxes (separately configurable for each remote AE)	No	-
Verification Service	Yes [TRUE or FALES]	TRUE
STORAGE-SCP AE Parameters		
Maximum PDU Size	Yes [4096-6292594bytes]	6292594bytes
STORAGE-SCP AE time-out waiting on an open Association for the next Request message (C-STORE-RQ, Association Close Request. etc.) (DIMSE timeout)	Yes [1-600s]	15 s
STORAGE-SCP AE maximum number of simultaneous Associations	Yes [1-32]	5
Always open a new Association to send a Storage Commitment Push Model Notification request (N-EVENT-REPORT-RQ).	No	TRUE
QUERY-RETRIEVE-SCP AE Parameters		
Maximum PDU Size	Yes [4096-6292594bytes]	6292594bytes
QUERY-RETRIEVE-SCP AE maximum number of simultaneous Associations	Yes [1-32]	15
MODALITY-WORKLIST-QUERY-SCP AE Parameters		
Maximum PDU Size	No	16kbytes

Parameter	Configurable (Yes/No) [RANGE]	Default Value
MODALITY_WORKLIST-QUERY-SCP AE maximum number of simultaneous Associations	Yes [1-15]	4
QUERY-RETRIEVE-SCU AE Parameters		
Maximum number of simultaneous Associations.	Yes [1-32]	3
ECHO-SCU AE Parameters		
Maximum number of simultaneous Associations.	Yes [1-32]	2

5 MEDIA INTERCHANGE

This product does not support Media Storage.

6 SUPPORT OF EXTENDED CHARACTER SETS

This product supports the following character sets:

- ISO-IR 6 (default) ISO 646
- ISO-IR 87 (Japanese) JIS X 0208 (Kanji)

The product can also receive and transmit images containing character sets other than those listed above, but the image viewer bundled with the product can correctly display only the character sets listed above.

Character set ISO -IR 87 can be set to the tags listed in the Table below;

Table 6-1
TAG LISTS FOR ISO-IR 87

Attribute Name	Tag ID	VR
Institution Name	(0008,0080)	LO
Referring Physician’s Name	(0008,0090)	PN
Study Description	(0008,1030)	LO
Series Description	(0008,103E)	LO
Patient’s Name	(0010,0010)	PN
Patient Comments	(0010,4000)	LT
Protocol Name	(0018,1030)	LO
Image Comments	(0020,4000)	LT
Requesting Physician	(0032,1032)	PN
Requesting Service	(0032,1033)	LO

7 SECURITY

7.1. SECURITY PROFILES

This product does not support any specific security measures.

It is assumed that the product is used within a secured environment. It is assumed that a secured environment includes at a minimum:

a) Firewall or router protections to ensure that only approved external hosts have network access to the product.
b) Firewall or router protections to ensure that the product only has network access to approved external hosts and services.
c) Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN))

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

7.2. ASSOCIATION LEVEL SECURITY

The QUERY-RETRIEVE-SCP AE and the STORAGE-SCP AE can both be configured to check the following DICOM values when determining whether to accept Association Open Requests:

Calling AE Title

Called AE Title

Application Context

Each SCP AE can be configured to accept Association Requests from only a limited list of Calling AE Titles. They SCP AEs can have different lists. Each SCP AE can be configured to check that the Association requestor specifies the correct Called AE Title for the SCP.

In addition the IP address of the requestor can be checked. The SCP AEs can be constrained to only accept Association Requests from a configured list of IP addresses. The SCP AE’s can have different lists.

8 ANNEXES

8.1. IOD CONTENTS

8.1.1. Storage-SCP AE Element Use

The following Elements of Composite SOP Instances received by the STORAGE-SCP AE are either stored to the permanent database or of particular importance in the received images.

Table 8.1-1
SIGNIFICANT ELEMENTS IN RECEIVED COMPOSITE SOP INSTANCES

Module	Attribute Name	Tag ID	Type	Significance
Patient	Patient Name	(0010,0010)	Opt	The received Patient Name can be changed. The value is saved to the database.
	Patient ID	(0010,0020)	Mand	Must be provided. The received Patient ID can be changed. The value is saved to database.
	Patient's Birth Date	(0010,0030)	Opt	The received Patient's Birth Date can be changed. The value is saved to database.
	Patient's Sex	(0010,0040)	Opt	The received Patient's Sex can be changed. The value is saved to database.
General Study	Study Instance UID	(0020,000D)	Mand	Must be provided. The value is saved to database.
	Study Date	(0008,0020)	Mand	Must be provided. The value is saved to database.
	Accession Number	(0008,0050)	Opt	STORAGE-SCP AE can be configured to apply a 16 digits sequence number value that begins with "9999" if there is no value specified. The value is saved to database.
	Study Description	(0008,1030)	Opt	The received Study Description can be changed. The value is saved to database.
General Series	Modality	(0008,0060)	Mand	Must be provided. The value is saved to database.
	Series Description	(0008,103E)	Opt	The value is saved to database.
	Body Part Examined	(0018,0015)	Opt	The value is saved to database.
	Series Instance UID	(0020,000E)	Mand	Must be provided The value is saved to database.
SOP Common	SOP Instance UID	(0008,0018)	Mand	Must be provided The value is saved to database.

The Type "Mand" means a mandatory element on TFS-01. TFS-01 can not handle image data that does not contain these mandatory elements. "Opt" menas an optional element. TFS-01 can handle image data that does not contain these optional elements.

8.1.2. Storage-SCU AE Element modification

The following table contains a list of all Elements that can have a value modified by the STORAGE-SCU at the time of export using the Storage Service depending on the capabilities of the receiver:

Table 8.1-2
SIGNIFICANT ELEMENTS IN EXPORTED COMPOSITE SOP INSTANCES

Module	Attribute Name	Tag ID	Value
General Image Module	Derivation Description	(0008,2111)	Set the compression algorithm and its parameters.
	Lossy Image Compression	(0028,2110)	Set '01'.
	Lossy Image Compression Ratio	(0028,2112)	Set the compression ratio.
Image Module	Image Type	(0008,0008)	Values 1 and 2 are modified. (Need Only at Lossy Data) Value1: DERIVED Value2: SECONDARY

8.2. DATA DICTIONARY OF PRIVATE ATTRIVUTES

Not applicable to this product.

8.3. CONTROLLED TERMINOLOGY AND TEMPLATES

Not applicable to this product

8.4. GRAYSCALE IMAGE CONSISTENCY

Not applicable to this product

8.5. STANDARD EXTENDED/SPECIALIZED/PRIVATE SOP CLASSES

8.5.1. Private SOP Class - Toshiba US Private Data Storage

Please refer the conformance statement of Diagnostic Ultrasound System MODEL TUS-A500/TUS-A400/TUS-300 Aplio 500/400/300(Document No. 2G985-007EN*E)

8.5.2. Private SOP Class - MI 3D Softcopy Presentation State

Please refer the conformance statement of the EasyViz Image Display in ViTAL Images (Document ID 2017.03.006)

8.6. PRIVATE TRANSFER SYNTAXES

Not applicable to this product