**DICOM
CONFORMANCE STATEMENT
FOR
MODEL   TOSMEC Aventy^{TM} SERIES
(MIIMS0019EA*A)**

CANON MEDICAL SYSTEMS CORPORATION

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1   CONFORMANCE STATEMENT OVERVIEW

Table 1-1 provides an overview of the network services supported by TOSMEC Aventy.

Table 1.1
NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Verification		
Verification	Yes	Yes
Transfer		
US Image Storage	No	Yes
US Multi-frame Storage	No	Yes
Computed Radiography Image Storage	No	Yes
CT Image Storage	No	Yes
MR Image Storage	No	Yes
XA Image Storage	No	Yes
RF Image Storage	No	Yes
NM Image Storage	No	Yes
PET Image Storage	No	Yes
Digital X-Ray Image Storage - For Presentation	No	Yes
Digital Mammography X-Ray Image Storage - For Presentation	No	Yes
Digital Intra-oral X-Ray Image Storage - For Presentation	No	Yes
RT Image Storage	No	Yes
Secondary Capture Image Storage	No	Yes
Storage Commitment Push Model	No	Yes
Enhanced CT Image Storage	No	Yes
Enhanced MR Image Storage	No	Yes
VL Endoscopic Image Storage	No	Yes
VL Photographic Image Storage	No	Yes
Encapsulated PDF Storage	No	Yes
Query/Retrieve		
Study Root Q/R - FIND	Yes	No
Study Root Q/R - MOVE	Yes	No
Workflow Management		
Modality Worklist Information Model – Find	No	Yes

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3 INTRODUCTION

3.1. REVISION HISTORY

REV.	Date	Author	Description
*	May 23, 2013	TMSC	Initial Version
A	January 4, 2018	Canon Medical Systems	Change of company name

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. ABBREVIATIONS

Definitions, terms and abbreviations used in this document are defined within the different parts of the

DICOM standard.

Abbreviations and terms are as follows:

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
KO	Key Object Slection
MR	Magnetic Resonance
MWM	Modality Worklist Management
NM	Nuclear Medicine
PDU	Protocol Data Unit
PET	Positron Emission Tomography
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
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
US	Ultrasound
VM	Value Multiplicity
VR	Value Representation
XA	X-Ray Angiography

3.5. 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
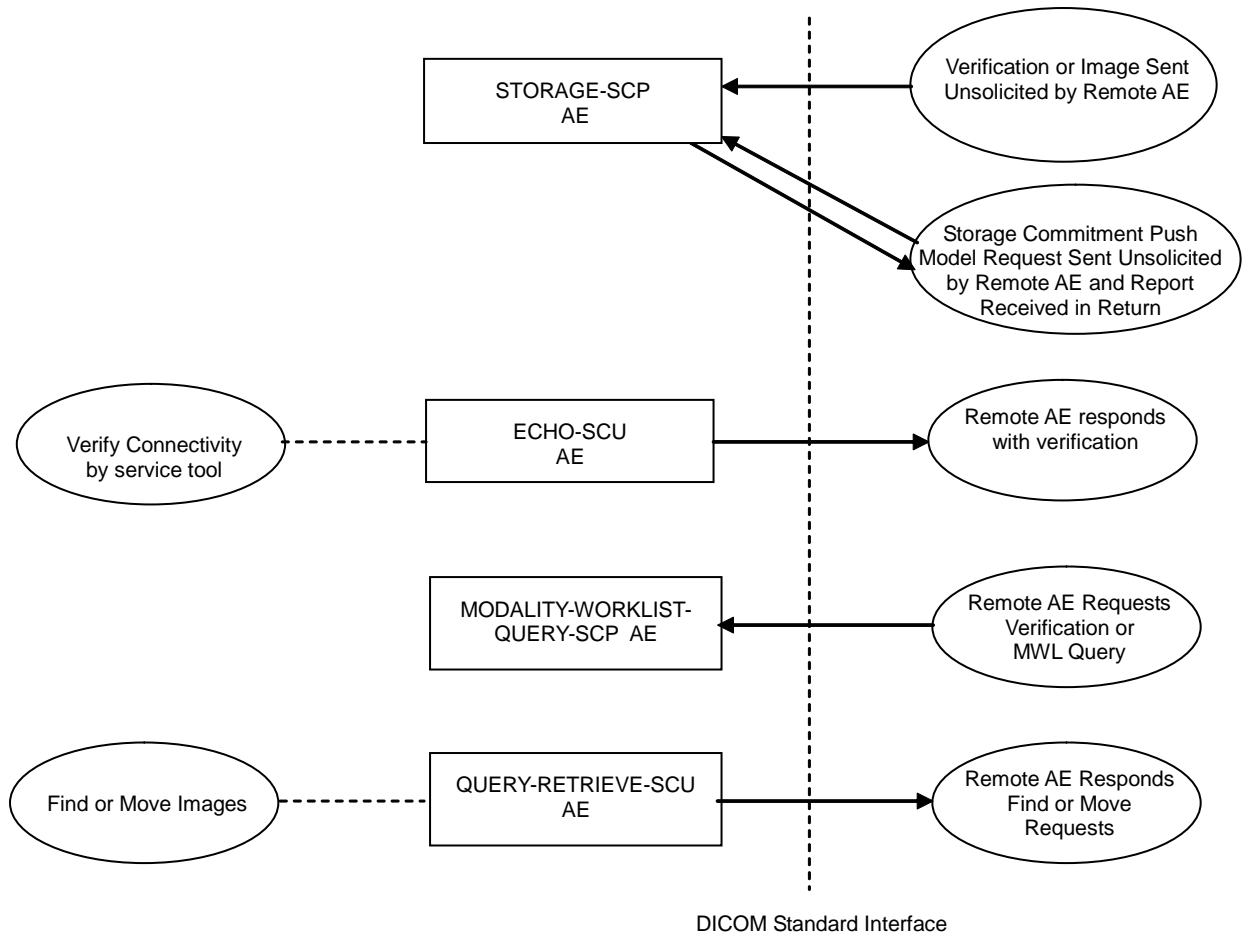
Figure 4.1-1
DICOM DATA FLOW DIAGRAM

— The STORAGE-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, serieses, images and sends the retrieve requests for selected studies, serieses, images.

4.1.2. Functional Definition of AEs

4.1.2.1. 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.

4.1.2.2. Functional Definition of ECHO-SCU AE

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

4.1.2.3. 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.

4.1.2.4. 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.
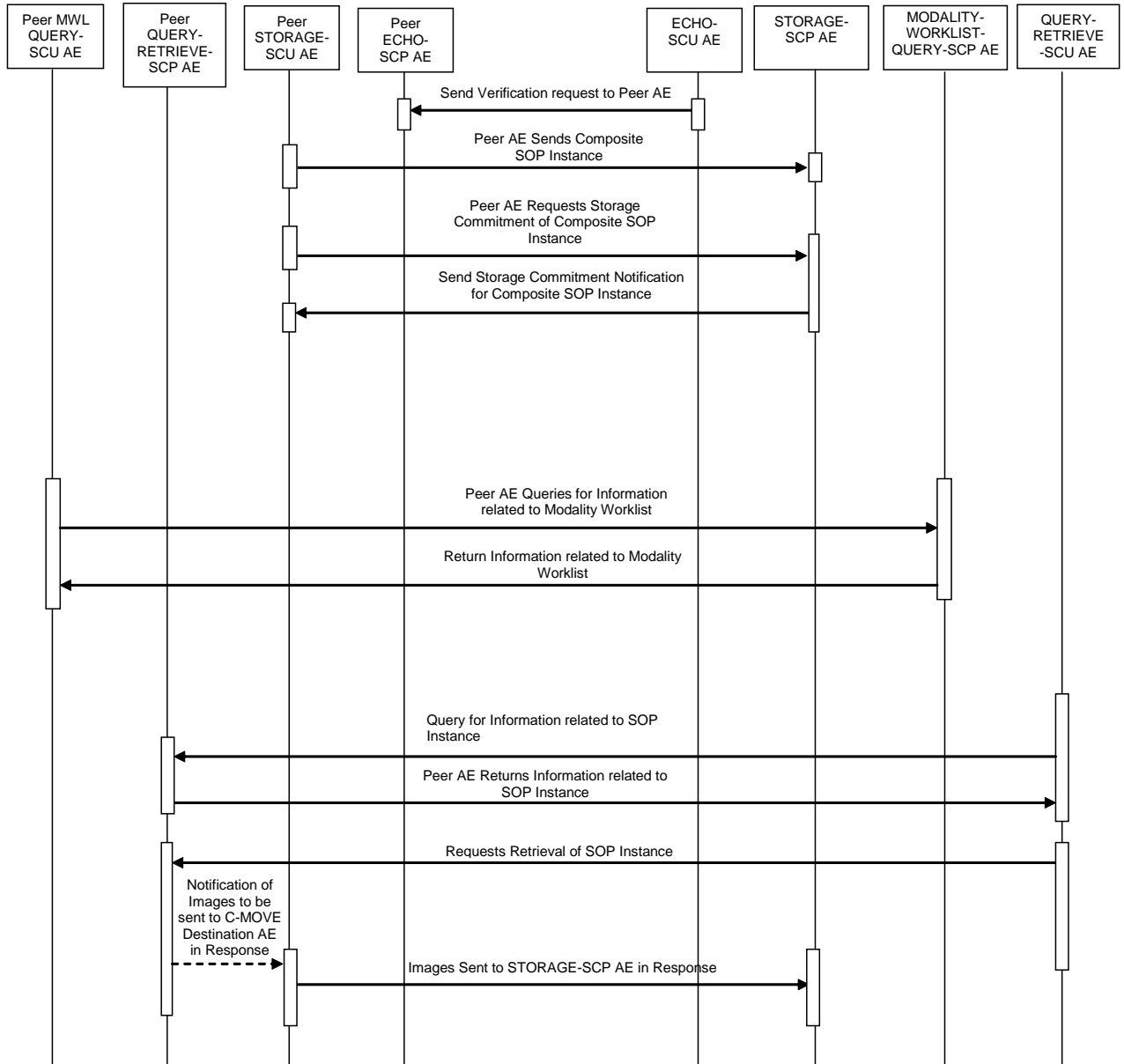
4.1.3. Sequencing of Real-World Activities

Figure 4.1-2
SEQUENCING CONSTRAINTS

4.2. AE SPECIFICATIONS

4.2.1. ECHO-SCU AE Specifications

4.2.1.1. SOP Class

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

Table 4.2-1
SOP CLASSES FOR ECHO-SCU AE

SOP Class	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No

4.2.1.2. Association Establishment Policies

4.2.1.2.1. 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 accepted.

Table 4.2-2
DICOM APPLICATION CONTEXTS FOR ECHO-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.

Table 4.2-3
NUMBERS OF ASSOCIATIONS AS A SCU FOR ECHO-SCU AE

Maximum Number of Simultaneous Associations	2 (Configurable)

4.2.1.2.3. 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 4.2-4
ASYNCHRONOUS NATURE AS A SCU FOR ECHO-SCU AE

Maximum Number of Outstanding Asynchronous Transactions	1

4.2.1.2.4. Implementation Identification Information

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

Implementation Class UID	1.2.392.200036.9116.7.28.1
Implementation Version Name	TM_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.

4.2.1.3. Association Initiation Policy

4.2.1.3.1. Activity - Verify Connectivity

4.2.1.3.1.1. Destination and Sequencing of Activity

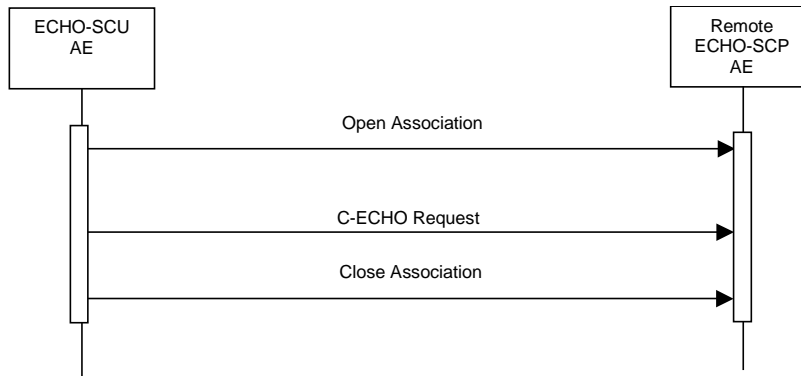The ECHO-SCU AE initiates association through user control.

Figure 4.2-1
SEQUENCING OF ACTIVITY – ECHO

The following sequencing restrictions, illustrated in figure 4.2-1, 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.

4.2.1.3.1.2. Proposed Presentation Context

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

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

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotia-tion
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

4.2.1.3.1.3. SOP Specific Conformance for Verivication 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 4.2-7
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.

4.2.1.4. Association Acceptance Policy

The ECHO-SCU AE does not accept associations.

4.2.2. STORAGE-SCP AE Specification

4.2.2.1. SOP Classes

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

Table 4.2-8
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
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
US Multi-frame Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	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
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	No	Yes
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	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
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	No	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	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
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	No	Yes

4.2.2.2. Association Policies

4.2.2.2.1. 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 4.2-9
DICOM APPLICATION CONTEXT FOR STORAGE-SCP AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.2.2.2. Number of Associations

The STORAGE-SCP AE can support up 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 4.2-10
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

4.2.2.2.3. 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 4.2-11
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 4.2-12
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

4.2.2.2.4. Implementation Identifying Information

The implementation information for this AE is:

Table 4.2-13
DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE-SCP AE

Implementation Class UID	1.2.392.200036.9116.7.28.1
Implementation Version Name	TM_OT_TFS01_1.0

.

4.2.2.3. Association Initiation Policy

4.2.2.3.1. Activity – Send Storage Commitment Notification over new Association

4.2.2.3.1.1. 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 4.2-2 will always be followed.
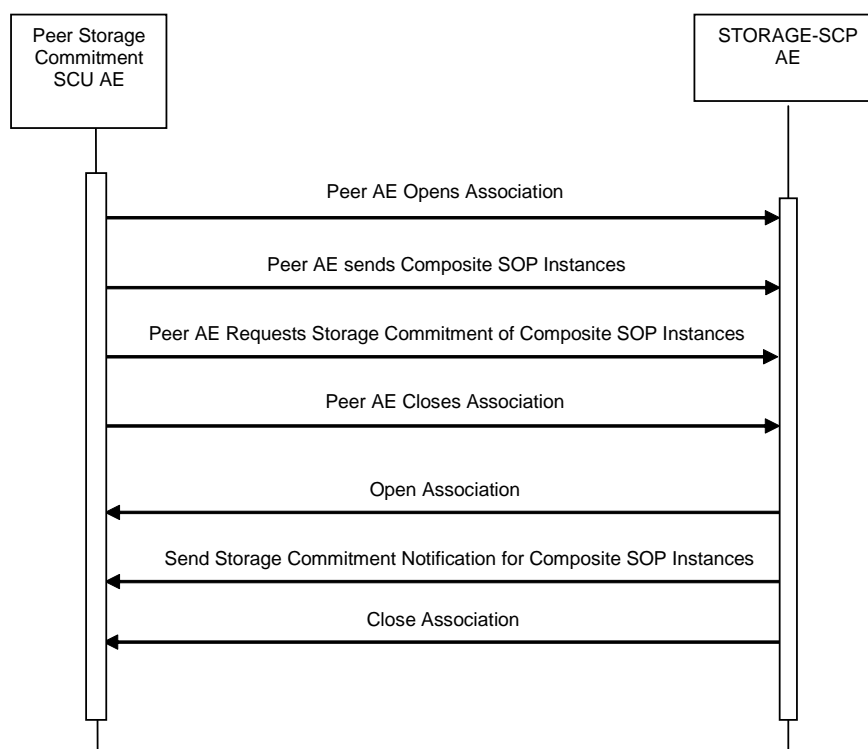
Figure 4.2-2
SEQUENCING OF ACTIVITY – SEND STORAGE
COMMITMENT NOTIFICATION OVER NEW ASSOCIATION

The following sequencing constraints illustrated in Figure 4.2-2 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 (ASCE related function)
c – DICOM UL service-provider (Presentation related function)

Table 4.2-14
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.

4.2.2.3.1.2. Accepted Presentation Contexts

The default Behavior of the STORAGE-SCP AE supports the Implicit VR Little Endian and Explicit VR Big Endian and Explicit VR Little Endian Transfer Syntaxes.

If the both Transfer Syntaxes are proposed per Presentation Context then the STORAGE-SCP AE will select Explicit VR Big Endian Transfer Syntax.
 Any of the Presentation Contexts shown in the following table are acceptable to the STORAGE-SCP AE.

Table 4.2-15
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
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
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM JPEG Lossless, Non-Hierarchical, First-	1.2.840.10008.1.2.4.70	SCP	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext.**
		Order Prediction			
US Multi-frame 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
US Multi-frame Storage	1.2.840.10008.5.1.4.1.1.3.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
US Multi-frame Storage	1.2.840.10008.5.1.4.1.1.3.1	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
US Multi-frame Storage	1.2.840.10008.5.1.4.1.1.3.1	DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	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
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	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 Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	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
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	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 Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	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
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	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
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext.**
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	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
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1	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 Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1	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
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
RF Image Storage	1.2.840.10008.5.1.4.1.1.12.2	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
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	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
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	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 Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	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	SCP	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

Presentation Context Table				
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext.**
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	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
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	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 Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	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
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	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 Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	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
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	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 Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	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
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
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
VL	1.2.840.10008.5.1.4.1.1.7	DICOM Explicit VR	1.2.840.10008.1.2.1	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext.
Endoscopic Image Storage	7.1.1	Little Endian			
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.7 7.1.1	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.7 7.1.1	DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.7 7.1.4	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.7 7.1.4	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.7 7.1.4	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.7 7.1.4	DICOM JPEG Lossless, Non-Hierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.1 04.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.1 04.1	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
Storage Commitment Push Model	1.2.840.10008.1.20.1	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None

4.2.2.3.1.3. SOP Specific Conformance for Verification SOP Class

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

4.2.2.3.1.4. 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 4.2-16
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.

4.2.2.3.1.5.   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 4.2-17
SUPPORTED REFERENCED SOP CLASSES IN STORAGE
COMMITMENT PUSH MODEL N-ACTION REQUESTS

Supported Referenced SOP Classes
US Image Storage
US Multi-frame Storage
Computed Radiography Image Storage
CT Image Storage
MR Image Storage
Secondary Capture Image Storage
XA Image Storage
RF Image Storage
NM Image Storage
PET 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
RT Image Storage
Enhanced CT Image Storage
Enhanced MR Image Storage
VL Endoscopic Image Storage
VL Photographic Image Storage
Encapsulated PDF Storage

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

Table 4.2-18
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 4.2-19
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 4.2-20
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.

4.2.3. MODALITY-WORKLIST-QUERY-SCP AE Specification

4.2.3.1. SOP Classes

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

Table 4.2-21
SOP CLASSES FOR MODALITY-WORKLIST-QUERY-SCP AE

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	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 4.2-22
DICOM APPLICATION CONTEXT FOR MODALITY-WORKLIST-QUERY-SCP AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.3.2.2. Number of Associations

The MODALITY-WORKLIST-QUERY-SCP AE can support up 5 Associations at a time

Table 4.2-23
NUMBER OF SIMULTANEOUS ASSOCIATIONS AS A SCP FOR MODALITY-WORKLIST-QUERY-SCP AE

Maximum number of simultaneous Associations	5 (Not Configurable)

4.2.3.2.3. 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 4.2-24
ASYNCHRONOUS NATURE AS A SCP FOR MODALITY-WORKLIST-QUERY-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 4.2-25
DICOM IMPLEMENTATION CLASS AND VERSION FOR MODALITY-WORKLIST-QUERY-SCP AE

Implementation Class UID	1.2.392.200036.9116.7.27.1
Implementation Version Name	TM_TRN_DCM_V1.0

4.2.3.3. Association Initiation Policy

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

4.2.3.4. Association Acceptance Policy

4.2.3.4.1. Activity – Handling Modality Worklist Query Requests

4.2.3.4.1.1. 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.
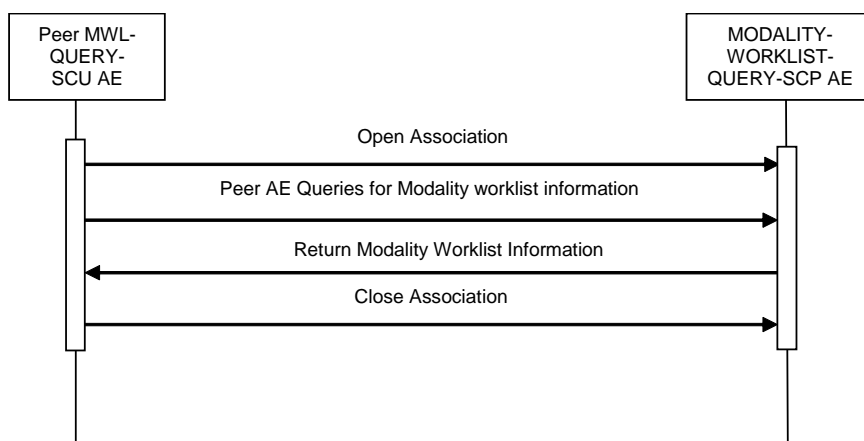

Figure 4.2-3
SEQUENCING OF ACTIVITY – HANDLING MWL QUERY REQUESTS

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

Table 4.2-26
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.

4.2.3.4.1.2.   Accepted Presentation Contexts

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

Table 4.2-27
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
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None

4.2.3.4.1.3.   SOP Specific Conformance for Modality Worklist SOP Classes

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

Table 4.2-28
MODALITY-WORKLIST-QUERY SCP AE SUPPORTED MATCHING KEY ELEMENTS
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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.
>Scheduled Performing Physician's Name	(0040,0006)	Required	Single Value Matching or Wild Card 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.

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

Table 4.2-29
MODALITY WORKLIST C-FIND SCP AE SUPPORTED RETURN KEY ELEMENTS

Description / Module	Tag	Return Key Type	Types of Matching
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	Not Set when no entry is made
Patient's Sex	(0010,0040)	2	Not Set when no entry is made
Patient's Weight	(0010,1030)	2	Always Set Length=0
Confidentiality Constraint on Patient Data Description	(0040,3001)	2	Always Set Length=0
Patient Medical Module			
Medical Alerts	(0010,2000)	2	Always Set Length=0
Contrast Allergies	(0010,2110)	2	Always Set Length=0
Special Needs	(0038,0050)	2	Always Set Length=0

Patient State	(0038,0500)	2	Always Set Length=0
Scheduled Procedure Step Module			
Scheduled Procedure Step Sequence	(0040,0100)	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
>Modality	(0008,0060)	1	Always Set
>Scheduled Performing Physician's Name	(0040,0006)	2	Always Set Length=0
> Requested Contrast Agent	(0032,1070)	2C	Always Set Length=0
>Scheduled Procedure Step Description	(0040,0007)	1C	Not Set
>Scheduled Action Item Code Sequence	(0040,0008)	1C	Always Set Length=0
>Scheduled Procedure Step ID	(0040,0009)	1	Always Set
>Scheduled Station Name	(0040,0010)	2	Always Set
>Scheduled Procedure Step Location	(0040,0011)	2	Always Set Length=0
> Pre-Medication	(0040,0012)	2C	Always Set Length=0
Requested Procedure Module			
Requested Procedure ID	(0040,1001)	1	Always Set
Requested Procedure Code Sequence	(0032,1064)	1C	Always Set Length=0
Requested Procedure Description	(0032,1060)	1C	Not Set
Study Instance UID	(0020,000D)	1	Always Set
Requested Procedure Priority	(0040,1003)	2	Always Set Length=0
Patient Transport Arrangements	(0040,1004)	2	Always Set Length=0
Referenced Study Sequence	(0008,1110)	2	Always Set Length=0
Imaging Service Request Module			
Accession Number	(0008,0050)	2	Always Set
Requesting Physician	(0032,1032)	2	Always Set Length=0
Referring Physician's Name	(0008,0090)	2	Always Set Length=0
Requesting Service	(0032,1033)	3	Not Set when no entry is made

Table 4.2-30
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.

4.2.4. QUERY-RETRIEVE-SCU AE Specification

4.2.4.1. SOP Classes

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

Table 4.2-31
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		

4.2.4.2. Association Policies

4.2.4.2.1. General

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

Table 4.2-32
DICOM APPLICATION CONTEXT FOR THE QUERY-RETRIEVE-SCU AE

Application Context Name	1.2.840.10008.3.1.1.1

4.2.4.2.2. Number of Associations

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

Table 4.2-33
NUMBER OF ASSOCIATIONS INITIATED FOR THE QUERY-RETRIEVE-SCU AE

Maximum number of simultaneous associations	3

4.2.4.2.3. Asynchronous Nature

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

Table 4.2-34
ASYNCHRONOUS NATURE FOR THE Q/R SCU AE

Maximum number of outstanding asynchronous transactions	1

4.2.4.2.4. Implementation Identifying Information

The implementation information for this Application Entity is:

Table 4.2-35
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	TM_OT_TFS01_1.0

4.2.4.3. Association Initiation Policy

4.2.4.3.1. Activity – Query and Retrieve Images

4.2.4.3.1.1. 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.
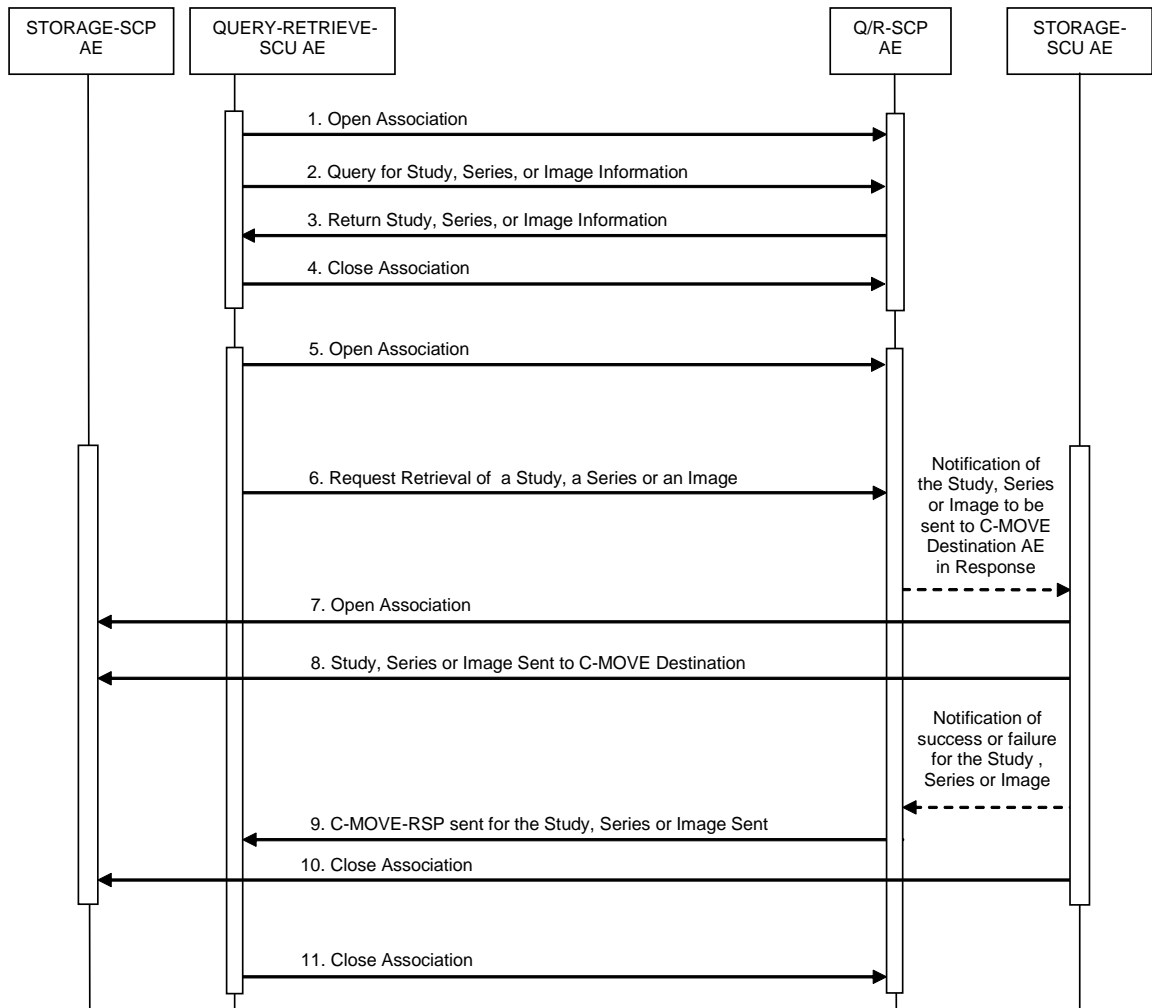
Figure 4.2-4
SEQUENCING OF ACTIVITY – QUERY AND RETRIEVE IMAGES

The following sequencing constraints illustrated in the Figure above:

1. The QUERY-RETRIEVE-SCU AE opens an association with the Q/R SCP AE.

2. The QUERY-RETRIEVE-SCU AE sends a C-FIND-RQ Message

3. The Q/R 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 Q/R SCP AE.

6. The QUERY-RETRIEVE-SCU AE sends a C-MOVE-RQ Message. The Q/R 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 Q/R SCP AE whether the transfer succeeded or failed.

9. The Q/R-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.

4.2.4.3.1.2. Proposed Presentation Contexts

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

Table 4.2-36
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		

4.2.4.3.1.3. 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 4.2-37
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 4.2-38
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 4.2-39
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)	U
Modality	(0008,0060)	U
Modalities in Study	(0008,0061)	U
Referring Physician's Name	(0008,0090)	U
Station Name	(0008,1010)	U
Study Description	(0008,1030)	U
Patient's Name	(0010,0010)	*
Patient's ID	(0010,0020)	*
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
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. An "S" indicates the identifier attribute uses Single Value Matching, an "R" indicates Range Matching, an "*" indicates wildcard 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.

4.2.4.3.1.4. 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 4.2-40
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 4.2-41
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.

4.2.4.4. Association Acceptance Policy

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

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 1000baseT
Ethernet 100baseTX
Ethernet 10baseT

4.3.2. Additional Protocols

None.

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-SCP	SCP		104
ECHO-SCU	SCU	TM_OT_TFS_01	Not Applicatable
QUERY-RETRIEVE-SCU	SCU		
MODALITY-WORKLIST-QUERY-SCP	SCP	AE_TOSMEC	51001

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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 [4-128kbytes]	64kbytes
Maximum PDU size as a SCU	Yes [4-128kbytes]	64kbytes
Time-out waiting for a 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/IPpackets (Low Level Timeout)	Yes [1-600s]	90s
STORAGE-SCP AE Parameters		
Maximum PDU Size	Yes [4-128kbytes]	64kbytes
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
MODALITY-WORKLIST-QUERY-SCP AE Parameters		
Maximum PDU Size	No	16kbytes
MODALITY_WORKLIST-QUERY-SCP AE maximum number of simultaneous Associations	No	5
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.

SOP Instances conforming to the following Composite Image SOP Classes are fully supported for display on the system workstations.

Table 8.1-1
SUPPORTED COMPOSITE IMAGE SOP CLASSES FOR DISPLAY

US Image Storage
US Multi-frame Storage
Computed Radiography Image Storage
CT Image Storage
MR Image Storage
Secondary Capture Image Storage
XA Image Storage
RF Image Storage
NM Image Storage
PET 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
RT Image Storage
Enhanced CT Image Storage
Enhanced MR Image Storage
VL Endoscopic Image Storage
VL Photographic Image Storage
Encapsulated PDF Storage

Table 8.1-2
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 this product. This product can not handle image data that does not contain these mandatory elements. "Opt" menas an optional element. This product can handle image data that does not contain these optional elements.

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

Not applicable to this product.

8.6. PRIVATE TRANSFER SYNTAXES

Not applicable to this product.