# SoliPACS Server

## DICOM Conformance Statement
## Volume 1
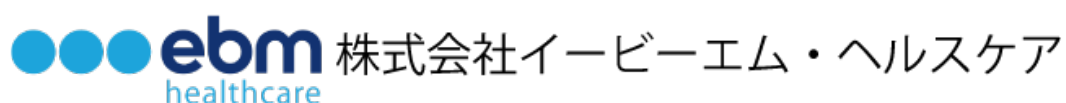### <Storage and Query/Retrieve Server>

Revision 7.0
Software Version 11.1 and after

Date: June 13, 2019

Prepared for

ebm healthcare 株式会社イービーエム・ヘルスケア

# 1. Conformance Statement Overview

This conformance statement is re-compiled in accordance with DICOM PS 3.2-2004 (Supplement 64 "Revised Part 2 (Conformance)").

The SoliPACS Server is a self-contained networked computer system used for archiving diagnostic medical images. It allows external systems to send images to it for long-term storage, retrieve information about such images, and retrieve the images themselves. The system conforms to the DICOM 3.0 standard to allow the sharing of medical information with other digital imaging systems.

**Table 1-1**
**SUPPORTED NETWORKING DICOM SERVICE (SOP) CLASSES**

| Networking Service Class | Initiator or User of Service | Provider of Service |
|---|---|---|
| **Image Transfer and Verification** | | |
| Verification | Yes | Yes |
| Storage Commitment Push Model | No | Yes |
| Computed Radiography Image Storage | Yes | Yes |
| Digital X-Ray Image Storage – For Presentation | Yes | Yes |
| Digital X-Ray Image Storage – For Processing | Yes | Yes |
| Digital Mammography X-Ray Image Storage – For Presentation | Yes | Yes |
| Digital Mammography X-Ray Image Storage – For Processing | Yes | Yes |
| Digital Intra-oral X-Ray Image Storage – For Presentation | Yes | Yes |
| Digital Intra-oral X-Ray Image Storage – For Processing | Yes | Yes |
| CT Image Storage | Yes | Yes |
| Enhanced CT Image Storage | Yes | Yes |
| US Multi-frame Storage (Retired) | Yes | Yes |
| US Multi-frame Storage | Yes | Yes |
| MR Image Storage | Yes | Yes |
| Enhanced MR Image Storage | Yes | Yes |
| MR Spectroscopy Storage | Yes | Yes |
| Nuclear Medicine Image Storage (Retied) | Yes | Yes |
| US Image Storage (Retired) | Yes | Yes |
| US Image Storage | Yes | Yes |
| Secondary Capture Image Storage | Yes | Yes |

| | | |
|---|---|---|
| Multi-frame Grayscale Byte Secondary Capture Image Storage | Yes | Yes |
| Multi-frame Grayscale Word Secondary Capture Image Storage | Yes | Yes |
| Multi-frame True Color Secondary Capture Image Storage | Yes | Yes |
| 12-lead ECG Waveform Storage | Yes | Yes |
| General ECG Waveform Strage | Yes | Yes |
| Ambulatory ECG Waveform Storage | Yes | Yes |
| Hemodynamic Waveform Storage | Yes | Yes |
| Cardiac Electrophysiology Waveform Storage | Yes | Yes |
| Basic Voice Audio Waveform Storage | Yes | Yes |
| Grayscale Softcopy Presentation State Storage | Yes | Yes |
| Color Softcopy Presentation State Storage | Yes | Yes |
| Pseudo-Color Softcopy Presentation State Storage | Yes | Yes |
| Blending Softcopy Presentation State Storage | Yes | Yes |
| X-Ray Angiographic Image Storage | Yes | Yes |
| X-Ray Radiofluoroscopic Image Storage | Yes | Yes |
| X-Ray Angiographic Bi-Plane Image Storage (Retired) | Yes | Yes |
| Nuclear Medicine Image Storage | Yes | Yes |
| Raw Data Storage | Yes | Yes |
| Spatial Registration Storage | Yes | Yes |
| Spatial Fiducials Storage | Yes | Yes |
| Deformable Segmentation Storage | Yes | Yes |
| Segmentation Storage | Yes | Yes |
| Real World Value Mapping Storage | Yes | Yes |
| VL Endoscopic Image Storage | Yes | Yes |
| Video Endoscopic Image Storage | Yes | Yes |
| VL Microscopic Image Storage | Yes | Yes |
| Video Microscopic Image Storage | Yes | Yes |
| VL Slide-Coordinates Microscopic Image Storage | Yes | Yes |
| VL Photographic Image Storage | Yes | Yes |
| Video Photometric Image Storage | Yes | Yes |
| Opthalomic Photography 8 Bit Image Storage | Yes | Yes |
| Opthalomic Photography 16 Bit Image Storage | Yes | Yes |
| Basic Text SR | Yes | Yes |
| Enhanced SR | Yes | Yes |
| Comprehensive SR | Yes | Yes |
| Procedure Log Storage | Yes | Yes |

| | | |
|---|---|---|
| Mammography CAD SR | Yes | Yes |
| Key Object Selection Document | Yes | Yes |
| Chest CAD SR | Yes | Yes |
| X-Ray Radiation Dose SR | Yes | Yes |
| Encapsulated PDF Storage | Yes | Yes |
| Positron Emission Tomography Image Storage | Yes | Yes |
| RT Image Storage | Yes | Yes |
| RT Dose Storage | Yes | No |
| RT Structure Set Storage | Yes | No |
| RT Beams Treatment Record Storage | Yes | No |
| RT Plan Storage | Yes | No |
| RT Brachy Treatment Record Storage | Yes | No |
| RT Treatment Summary Record Storage | Yes | No |
| RT Ion Plan Storage | Yes | No |
| RT Icon Beams Treatment Record Storage | Yes | No |
| **Query/Retrieve** | | |
| Patient Root Q/R – FIND | No | Yes (Note 1) |
| Patient Root Q/R – MOVE | No | Yes (Note 2) |
| Study Root Q/R – FIND | Yes | Yes (Note1) |
| Study Root Q/R – MOVE | Yes | Yes (Note 2) |

Note 1:  Relational Queries and Retrieval are supported as an SCU and SCP.

Note 2:  Retrieve (Q/R-MOVE) SCP is optional. If the option is not installed, Presentation Contexts for Patient Root Q/R – MOVE and Study Root Q/R – MOVE will be rejected during Association establishment.

# 2. Table of Contents

## 3. Introduction

### 3.1 Revision History

| Document Revision | Date | Author | Description |
|---|---|---|---|
| 4.0 | January 15, 2005 | M. Kobayashi | Revised per DICOM 2004 Part 2 |
| 4.0b | January 28, 2005 | M. Kobayashi | Typographical error corrections |
| 4.0c | February 9, 2005 | M. Kobayashi | QUERY/RETRIEVE-SCU AEs added. |
| 4.1 | July 19, 2005 | M. Kobayashi | Supports Encapsulated PDF Storage SOP Class |
| 6.0 | August 14, 2007 | M. Kobayashi | Changes of supported Storage SOP Classes |
| 6.0b | January 15, 2008 | M. Kobayashi | Typographical error corrections |

### 3.2 Audience

This document is intended for hospital staff, health system integrators, software designers or 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 information intended.

The scope of this Conformance Statement is to facilitate communication between the SoliPACS Server and other DICOM systems. The Conformance Statement should be read and understood in conjunction with the DICOM Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

— The comparison of different Conformance Statements is the first step towards assessing interconnectivity between SoliPACS Server and other DICOM conformant equipment.

— Test procedures should be defined to validate the desired level of connectivity.

— The DICOM standard will evolve to meet the users' future requirements. SoliPACS Server is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

## 3.4 Abbreviations and Acronyms:

| | |
|---|---|
| AE | Application Entity |
| CR | Computerized radiography |
| CT | Computerized Tomography |
| DICOM | Digital Imaging and Communications in Medicine |
| IE | Information Entity |
| IOD | Information Object Definition |
| ISO | International Standards Organization |
| MR | Magnetic Resonance |
| PDF | Portable Document Format |
| PDU | Protocol Data Unit |
| SC | Secondary Capture |
| SCP | Service Class Provider |
| SCU | Service Class User |
| SOP | Service-Object Pair |
| SR | Structured Reporting |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| UID | Unique Identifier |
| US | Ultrasound |
| VM | Value Multiplicity |
| VL | Visible Light |
| VR | Value Representation |

# 4. Networking
## 4.1 Implementation Model
### 4.1.1 Application Data Flow

The division of SoliPACS Server into the separate DICOM Application Entities represents a somewhat arbitrary partitioning of functionality. For the purpose of this document they are organized in this manner so as to detail their independent logical functionality.

SoliPACS Server is configured so that the QUERY-RETRIEVE-SCP AE, STORAGE-SCU AE and QUERY-RETRIEVE-SCP AE share the same Application Entity Title.
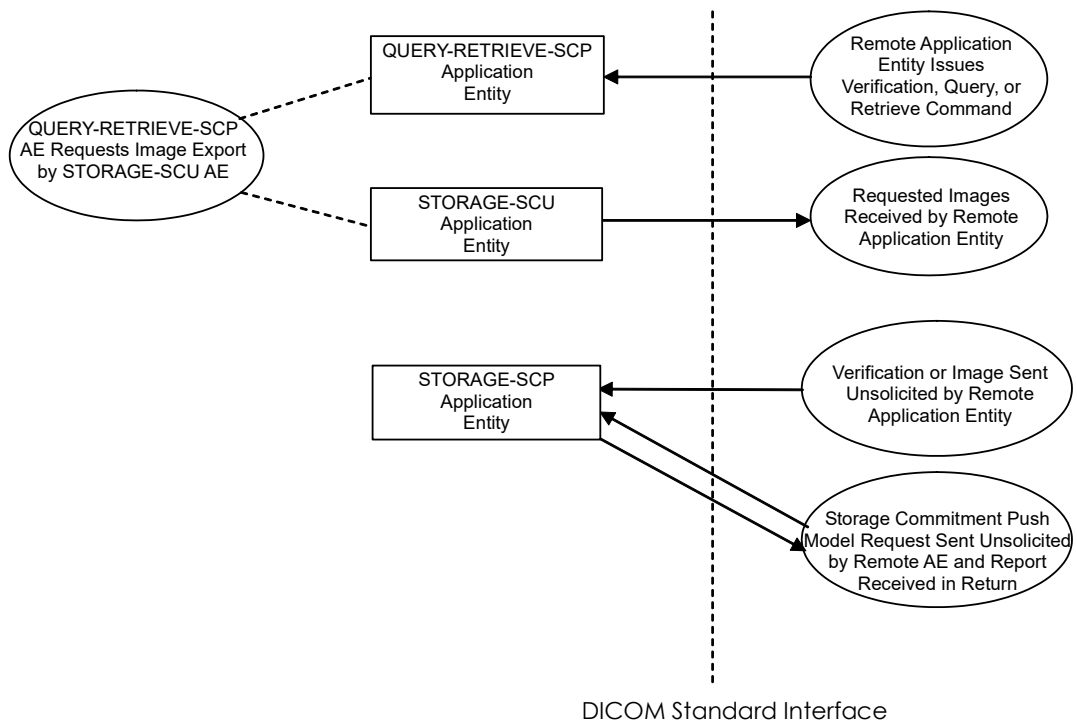


**Figure 4.1-1**

**SOLIPACS SERVER DICOM DATA FLOW DIAGRAM**

The Application Entities detailed in the Application Data Flow Diagram are all Windows 2003 applications.

— The STORAGE-SCU AE can send Composite SOP Instances. It handles requests from the QUERY-RETRIEVE-SCP AE to transmit Images to a specific DICOM destination. The STORAGE-SCU AE functions as a C-STORE SCU. Local User can request to send Composite SOP Instances to a Remote AE.

— 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 SoliPACS Server database. It can respond to external Storage Requests as a Service Class Provider (SCP) for solicited C-STORE requests.

### 4.1.2 Functional Definition of AEs

### 4.1.2.1 Functional Definition of STORAGE-SCU Application Entity

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 IP address and port number of any external DICOM AE's that are to be C-MOVE retrieval destinations. The Presentation Contexts to use are determined from the headers of the DICOM files to be transferred. Some conversion of the DICOM image objects is possible if the original Presentation Context is not supported by the remote destination AE or if decompression is preferred.

### 4.1.2.2 Functional Definition of QUERY-RETRIEVE-SCP Application Entity

The QUERY-RETRIEVE-SCP AE waits for another application to connect at the presentation address configured for its Application Entity 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 SoliPACS Server 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 Application Entity**

The STORAGE-SCP AE waits for another application to connect at the presentation address configured for its Application Entity 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 SoliPACS Server database. If a Storage Commitment Push Model N-ACTION Request is received then the STORAGE-SCP AE will immediately check if the referenced Composite SOP Instances are in the SoliPACS Server 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.

## 4.1.3 Sequencing of Real-World Activities

The only sequencing constraint that exists across all the SoliPACS Server Application Entities is the fact that a Composite SOP Instance must be received by the STORAGE-SCP AE before Storage Commitment Push Model or Query-Retrieve Requests related to this SOP Instance can be successfully handled:
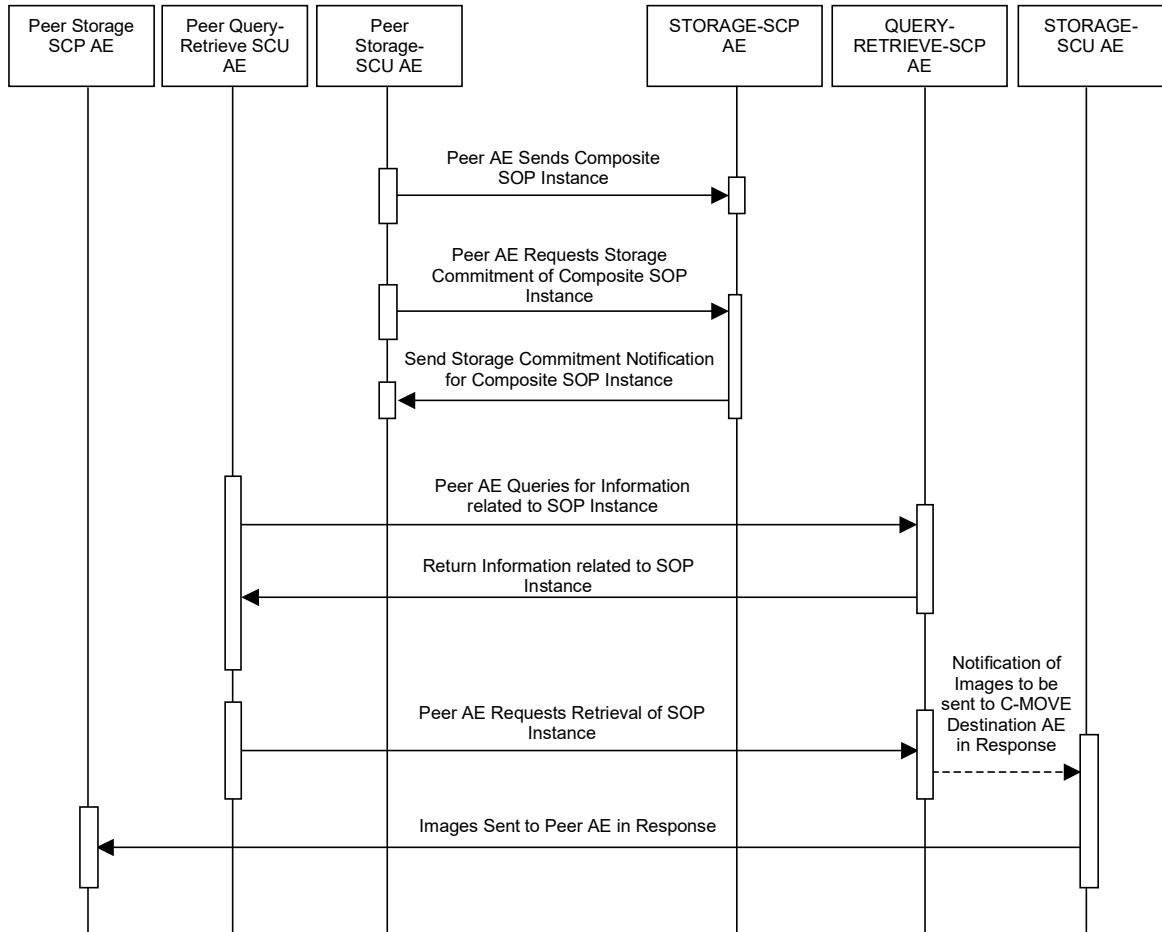


**Figure 4.1-2**
**SEQUENCING CONSTRAINTS**

Note that the only constraint is for the Composite SOP Instance to be received prior to the other events. For example, it is not necessary for the Storage Commitment Push Model Request to be received prior to receiving Query or Retrieval Requests related to the SOP Instance.

## 4.2 AE Specifications

## 4.2.1 STORAGE-SCU Application Entity Specification

## 4.2.1.1 SOP Classes

The STORAGE-SCU AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

**Table 4.2-1 SOP CLASSES FOR STORAGE-SCU AE**

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Verification | 1.2.840.10008.1.1 | Yes | No |
| 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 X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.1.1 | Yes | No |
| Digital Mammography X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | Yes | No |
| Digital Mammography X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | Yes | No |
| Digital Intra-oral X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.3 | Yes | No |
| Digital Intra-oral X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.3.1 | 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 Storage (Retired) | 1.2.840.10008.5.1.4.1.1.3 | Yes | No |
| US Multi-frame 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 |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 | Yes | No |
| Nuclear Medicine Image Storage (Retied) | 1.2.840.10008.5.1.4.1.1.5 | Yes | No |
| US Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 | Yes | No |
| US Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | 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 Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 | Yes | No |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | Yes | No |

| | | | |
|---|---|---|---|
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 | Yes | No |
| General ECG Waveform Strage | 1.2.840.10008.5.1.4.1.1.9.1.2 | Yes | No |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 | Yes | No |
| Hemodynamic Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.2.1 | Yes | No |
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 | Yes | No |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 | Yes | No |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 | Yes | No |
| Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.2 | Yes | No |
| Pseudo-Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.3 | Yes | No |
| Blending Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.4 | Yes | No |
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 | Yes | No |
| X-Ray Radiofluoroscopic Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 | Yes | No |
| X-Ray Angiographic Bi-Plane Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.12.3 | Yes | No |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 | Yes | No |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 | Yes | No |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | Yes | No |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 | Yes | No |
| Deformable Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.3 | Yes | No |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 | Yes | No |
| Real World Value Mapping Storage | 1.2.840.10008.5.1.4.1.1.67 | Yes | No |
| VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 | Yes | No |
| Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | Yes | No |
| VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 | Yes | No |
| Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 | Yes | No |
| VL Slide-Coordinates Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.3 | Yes | No |
| VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 | Yes | No |
| Video Photometric Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 | Yes | No |
| Opthalomic Photography 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | Yes | No |
| Opthalomic Photography 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 | Yes | No |
| Basic Text SR | 1.2.840.10008.5.1.4.1.1.88.11 | Yes | No |

| | | | |
|---|---|---|---|
| Enhanced SR | 1.2.840.10008.5.1.4.1.1.88.22 | Yes | No |
| Comprehensive SR | 1.2.840.10008.5.1.4.1.1.88.33 | Yes | No |
| Procedure Log Storage | 1.2.840.10008.5.1.4.1.1.88.40 | Yes | No |
| Mammography CAD SR | 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 |
| Chest CAD SR | 1.2.840.10008.5.1.4.1.1.88.65 | Yes | No |
| X-Ray Radiation Dose SR | 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 |
| Positron Emission Tomography Image | 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 Brachy Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.6 | Yes | No |
| RT Treatment Summary Record Storage | 1.2.840.10008.5.1.4.1.1.481.7 | Yes | No |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 | Yes | No |
| RT Icon Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.9 | Yes | No |

### 4.2.1.2 Association Establishment Policies

### 4.2.1.2.1 General

The STORAGE-SCU AE can form Associations when requested to do so by the QUERY-RETRIEVE-SCP AE in conjunction with C-MOVE request or STORAGE-SCP for auto-routing. It can also form Associations when requested by Local User for manual transmission of images. 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 3.0 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 64. The STORAGE-SCU AE can initiate simultaneous Associations to a given external C-MOVE Destination AE up to the maximum number. There is no separate limit on the maximum number permitted to the same C-MOVE Destination AE.

In case of auto-routing (transmit SOP instance received by STORAGE-SCP to a remove 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 zero.

**Table 4.2-3**

**NUMBER OF ASSOCIATIONS AS A SCU FOR STORAGE-SCU AE**

| Maximum number of simultaneous Associations | 64 |
|---|---|

### 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 | 1.2.840.113820.60 |
|---|---|
| Implementation Version Name | EBM_DICOM_30 |

Note that All SoliPACS Server AE's use the same Implementation Class UID and the same Implementation Version Name.

**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.

In addition to transmissions in response to a C-MOVE Request from a peer AE, STORAGE-SCU initiates a new Association, when Local User requests to transmit images to a pear AE. This user action is referred to as "manual transmission". Behavior of STROAGE-SCU for manual transmission is identical to the transmission invoked by QUERY-RETRIEVE-SCP AE.

STORAGE-SCU also initiates a new Association, when configured to transmit copy of SOP instances to another AE. This transmission activity is referred to as "auto-route".
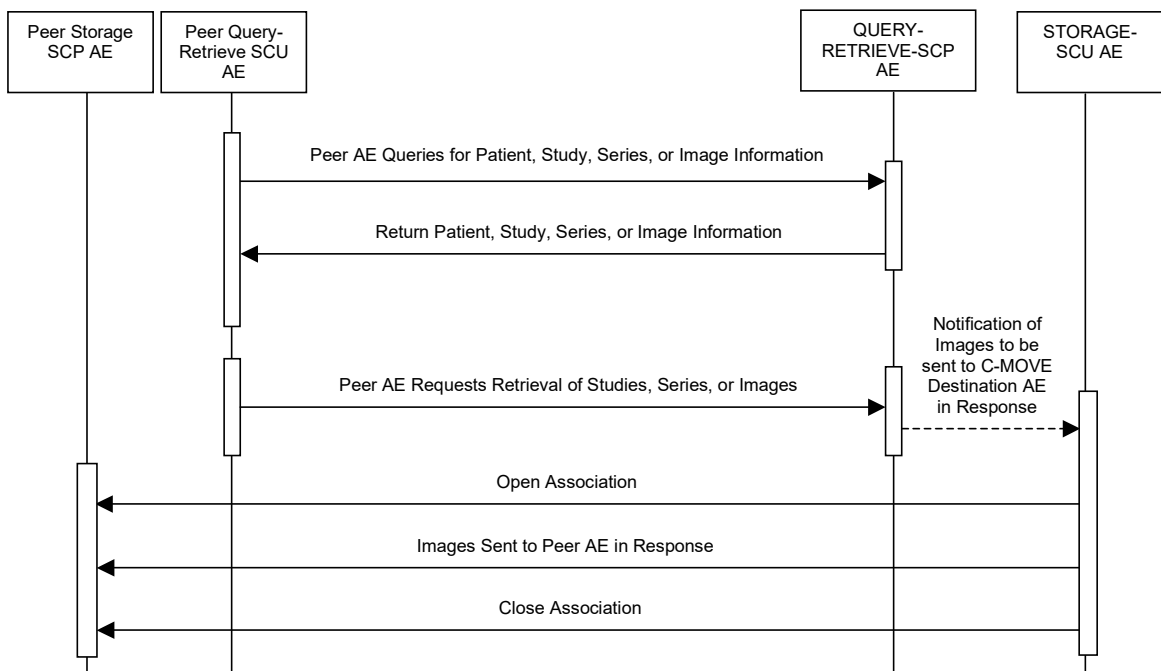
**Figure 4.2-1**

**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 sends the indicated Composite SOP Instances.

5. STORAGE-SCU AE closes the Association.

6. The Verification Service is only supported as a utility function for Service staff. It is used only as a diagnostic tool.

### 4.2.1.3.1.2 Proposed Presentation Contexts

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

**Table 4.2-5**

**PROPOSED PRESENTATION CONTEXTS BY THE STORAGE-SCU AE**

| Presentation Context Table | | | | |
|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
| Name | UID | Table | | |
| Verification | 1.2.840.10008.1.1 | 4.2-5.1 | SCU | None |
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 | 4.2-5.2 | SCU | None |
| Digital X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.1 | 4.2-5.2 | SCU | None |
| Digital X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.1.1 | 4.2-5.2 | SCU | None |
| Digital Mammography X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | 4.2-5.2 | SCU | None |
| Digital Mammography X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | 4.2-5.2 | SCU | None |
| Digital Intra-oral X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.3 | 4.2-5.2 | SCU | None |
| Digital Intra-oral X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.3.1 | 4.2-5.2 | SCU | None |
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 | 4.2-5.2 | SCU | None |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 | 4.2-5.2 | SCU | None |
| US Multi-frame Storage (Retired) | 1.2.840.10008.5.1.4.1.1.3 | 4.2-5.2 | SCU | None |
| US Multi-frame Storage | 1.2.840.10008.5.1.4.1.1.3.1 | 4.2-5.2 | SCU | None |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | 4.2-5.2 | SCU | None |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | 4.2-5.2 | SCU | None |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 | 4.2-5.2 | SCU | None |
| Nuclear Medicine Image Storage (Retied) | 1.2.840.10008.5.1.4.1.1.5 | 4.2-5.2 | SCU | None |
| US Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 | 4.2-5.2 | SCU | None |
| US Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | 4.2-5.2 | SCU | None |

| Presentation Context Table | | | | |
|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | 4.2-5.2 | SCU | None |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 | 4.2-5.2 | SCU | None |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 | 4.2-5.2 | SCU | None |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | 4.2-5.2 | SCU | None |
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 | 4.2-5.1 | SCU | None |
| General ECG Waveform Strage | 1.2.840.10008.5.1.4.1.1.9.1.2 | 4.2-5.1 | SCU | None |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 | 4.2-5.1 | SCU | None |
| Hemodynamic Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.2.1 | 4.2-5.1 | SCU | None |
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 | 4.2-5.1 | SCU | None |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 | 4.2-5.1 | SCU | None |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 | 4.2-5.1 | SCU | None |
| Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.2 | 4.2-5.1 | SCU | None |
| Pseudo-Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.3 | 4.2-5.1 | SCU | None |
| Blending Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.4 | 4.2-5.1 | SCU | None |
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 | 4.2-5.2 | SCU | None |
| X-Ray Radiofluoroscopic Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 | 4.2-5.2 | SCU | None |
| X-Ray Angiographic Bi-Plane Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.12.3 | 4.2-5.2 | SCU | None |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 | 4.2-5.2 | SCU | None |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 | 4.2-5.1 | SCU | None |

| Presentation Context Table | | | | |
|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | **Role** | **Ext. Neg.** |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | 4.2-5.1 | SCU | None |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 | 4.2-5.1 | SCU | None |
| Deformable Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.3 | 4.2-5.1 | SCU | None |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 | 4.2-5.1 | SCU | None |
| Real World Value Mapping Storage | 1.2.840.10008.5.1.4.1.1.67 | 4.2-5.1 | SCU | None |
| VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 | 4.2-5.2 | SCU | None |
| Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | 4.2-5.2 | SCU | None |
| VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 | 4.2-5.2 | SCU | None |
| Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 | 4.2-5.2 | SCU | None |
| VL Slide-Coordinates Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.3 | 4.2-5.2 | SCU | None |
| VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 | 4.2-5.2 | SCU | None |
| Video Photometric Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 | 4.2-5.2 | SCU | None |
| Opthalomic Photography 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | 4.2-5.2 | SCU | None |
| Opthalomic Photography 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 | 4.2-5.2 | SCU | None |
| Basic Text SR | 1.2.840.10008.5.1.4.1.1.88.11 | 4.2-5.1 | SCU | None |
| Enhanced SR | 1.2.840.10008.5.1.4.1.1.88.22 | 4.2-5.1 | SCU | None |
| Comprehensive SR | 1.2.840.10008.5.1.4.1.1.88.33 | 4.2-5.1 | SCU | None |
| Procedure Log Storage | 1.2.840.10008.5.1.4.1.1.88.40 | 4.2-5.1 | SCU | None |
| Mammography CAD SR | 1.2.840.10008.5.1.4.1.1.88.50 | 4.2-5.1 | SCU | None |
| Key Object Selection Document | 1.2.840.10008.5.1.4.1.1.88.59 | 4.2-5.1 | SCU | None |
| Chest CAD SR | 1.2.840.10008.5.1.4.1.1.88.65 | 4.2-5.1 | SCU | None |
| X-Ray Radiation Dose SR | 1.2.840.10008.5.1.4.1.1.88.67 | 4.2-5.1 | SCU | None |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 | 4.2-5.1 | SCU | None |
| Positron Emission Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.128 | 4.2-5.2 | SCU | None |
| RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 | 4.2-5.2 | SCU | None |

| Presentation Context Table | | | | |
|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | **Role** | **Ext. Neg.** |
| RT Dose Storage | 1.2.840.10008.5.1.4.1.1.481.2 | 4.2-5.1 | SCU | None |
| RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 | 4.2-5.1 | SCU | None |
| RT Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.4 | 4.2-5.1 | SCU | None |
| RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 | 4.2-5.1 | SCU | None |
| RT Brachy Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.6 | 4.2-5.1 | SCU | None |
| RT Treatment Summary Record Storage | 1.2.840.10008.5.1.4.1.1.481.7 | 4.2-5.1 | SCU | None |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 | 4.2-5.1 | SCU | None |
| RT Icon Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.9 | 4.2-5.1 | SCU | None |

**Table 4.2-5.1**

**TRANSFER SYNTAX COMBINATION FOR NON-IMAGE STORAGE SOP CLASSES**

| Transfer Syntax | |
|---|---|
| **Name** | **UID** |
| Implicit VR Little Endian | 1.2.840.10008.1.2 |
| Explicit VR Little Endian | 1.2.840.10008.1.2.1 |

**Table 4.2-5.2**

**TRANSFER SYNTAX COMBINATION FOR IMAGE STORAGE SOP CLASSES**

| Transfer Syntax | |
|---|---|
| **Name** | **UID** |
| Implicit VR Little Endian | 1.2.840.10008.1.2 |
| Explicit VR Little Endian | 1.2.840.10008.1.2.1 |
| JPEG 8 Bit Image Compression | 1.2.840.10008.1.2.4.50 |
| JPEG 12 Bit Image Compression | 1.2.840.10008.1.2.4.51 |
| JPEG Lossless Image Compression | 1.2.840.10008.1.2.4.70 |
| JPEG 2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.90 |
| JPEG 2000 Image Compression | 1.2.840.10008.1.2.4.91 |
| RLE Lossless | 1.2.840.10008.1.2.5 |

### 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

Composite DICOM SOP Instances are maintained as DICOM Part 10 compliant files in the SoliPACS Server database. The entire set of tags received with the image will be saved in SoliPACS Server; this includes all Private and SOP Extended Elements. When a SOP Instance is selected for export from SoliPACS Server, its content will be exported as it was originally received except for a few possible exceptions. Some of the Patient demographic and Study information Elements whose values can have been altered due to changes administered on SoliPACS Server or changes to the state of the image data due to compression can be altered when the SOP Instance is exported.

The Patient demographic and Study information can be entered or altered by several means: manually, from HL7 messaging, or from DICOM Modality Worklist information.

The SoliPACS Server creates files called Communication Logs that can be used to

monitor their status and diagnose any problems that may arise. If any error occurs during DICOM communication, then appropriate messages are always output to these Communication Logs. 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 4.2-6**

**STORAGE-SCU AE C-STORE RESPONSE STATUS HANDLING BEHAVIOR**

| Service Status | Further Meaning | Error Code | Behavior |
|---|---|---|---|
| Success | Success | 0000 | The SCP has successfully stored the exported SOP Instance.   A message is sent to the QUERY-RETRIEVE-SCP AE indicating successful export.   The QUERY-RETRIEVE-SCP AE will send an appropriate status in the C-MOVE Response. Success indication message is output to the Communication Logs. |
| Refused | Out of Resources | A700 – A7FF | This is treated as a permanent Failure.   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 Communication Logs. |
| Error | Data Set does not match SOP Class | A900 – A9FF | This is treated as a permanent Failure.   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 Communication Logs. |
| | Cannot Understand | C000 - CFFF | This is treated as a permanent Failure.   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 Communication Logs. |
| Warning | Coercion of Data Elements | B000 | Image transmission is considered successful with warning.   A message is sent to the QUERY-RETRIEVE-SCP AE indicating export with warning.   The QUERY-RETRIEVE-SCP AE will send an appropriate status in the C-MOVE Response. Warning indication message is output to the Communication Logs. |

| | | | |
|---|---|---|---|
| | Data Set does not match SOP Class | B007 | Image transmission is considered successful with warning.   A message is sent to the QUERY-RETRIEVE-SCP AE indicating export with warning.   The QUERY-RETRIEVE-SCP AE will send an appropriate status in the C-MOVE Response.<br><br>Warning indication message is output to the Communication Logs. |
| | Elements Discarded | B006 | Image transmission is considered successful with warning.   A message is sent to the QUERY-RETRIEVE-SCP AE indicating export with warning.   The QUERY-RETRIEVE-SCP AE will send an appropriate status in the C-MOVE Response.<br><br>Warning indication message is output to the Communication Logs. |
| | Attribute List Error | 0107 | Image transmission is considered successful with warning.   A message is sent to the QUERY-RETRIEVE-SCP AE indicating export with warning.   The QUERY-RETRIEVE-SCP AE will send an appropriate status in the C-MOVE Response.<br><br>Warning indication message is output to the Communication Logs. |
| | Attribute Value Out of Range | 0116 | Image transmission is considered successful with warning.   A message is sent to the QUERY-RETRIEVE-SCP AE indicating export with warning.   The QUERY-RETRIEVE-SCP AE will send an appropriate status in the C-MOVE Response.<br><br>Warning indication message is output to the Communication Logs. |
| * | * | Any other status code. | This is treated as a permanent Failure.   A message is sent to the QUERY-RETRIEVE-SCP AE indicating an export failure and the Association is released.   The QUERY-RETRIEVE-SCP AE will send an appropriate Status in the C-MOVE Response.<br><br>Error indication message is output to the Communication Logs. |

The STORAGE-SCU AE does not resend images, when image is transmitted in conjunction with C-MOVE request and when an error Status Code is returned in a C-STORE Response. For specific behavior regarding Status Code values returned in C-MOVE Responses, refer to the Services Supported as an SCP by the QUERY-RETRIEVE-SCP AE.

**Table 4.2-6.1**

**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.<br><br>Error indication message is output to the Communication Logs. |
| 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.<br><br>Error indication message is output to the Communication Logs. |
| 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.<br><br>Error indication message is output to the Communication Logs. |

## 4.2.1.4 Association Acceptance Policy

The STORAGE-SCU AE does not accept Associations.

### 4.2.2 QUERY-RETRIEVE-SCP Application Entity Specification

### 4.2.2.1 SOP Classes

The QUERY-RETRIEVE-SCP AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

**Table 4.2-7**

**SOP CLASSES FOR QUERY-RETRIEVE-SCP AE**

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Verification | 1.2.840.10008.1.1 | No | Yes |
| 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 |

### 4.2.2.2 Association Establishment Policies

### 4.2.2.2.1 General

The QUERY-RETRIEVE-SCP AE will accept Associations for Verification, C-FIND, and C-MOVE requests.   In the case of a C-MOVE request, the QUERY-RETRIEVE-SCP AE will issue a command to the STORAGE-SCU AE to initiate an Association with the Destination DICOM AE to send images as specified by the originator of the C-MOVE Request.

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

**Table 4.2-8**

**DICOM APPLICATION CONTEXT FOR QUERY-RETRIEVE-SCP AE**

| Application Context Name | 1.2.840.10008.3.1.1.1 |
|---|---|

### 4.2.2.2.2 Number of Associations

The QUERY-RETRIEVE-SCP AE can support multiple simultaneous Associations.   Each time the QUERY-RETRIEVE-SCP AE receives an Association, a child process will be spawned to process the Verification, Query, or Retrieval request.   The maximum number of child processes, and thus the maximum number of simultaneous Associations that can be processed, is 64.

**Table 4.2-9**

**NUMBER OF SIMULTANEOUS ASSOCIATIONS AS A SCP FOR QUERY-RETRIEVE-SCP AE**

| Maximum number of simultaneous Associations | 64 |
|---|---|

### 4.2.2.2.3  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 4.2-10**

**ASYNCHRONOUS NATURE AS A SCP FOR QUERY-RETRIEVE-SCP AE**

| Maximum number of outstanding asynchronous transactions | 1 |
|---|---|

### 4.2.2.2.4 Implementation Identifying Information

The implementation information for the Application Entity is:

**Table 4.2-11**

**DICOM IMPLEMENTATION CLASS AND VERSION FOR QUERY-RETRIEVE-SCP AE**

| Implementation Class UID | 1.2.840.113820.60 |
|---|---|
| Implementation Version Name | EBM_DICOM_30 |

Note that All SoliPACS Server AE's use the same Implementation Class UID and the same Implementation Version Name.

### 4.2.2.3 Association Initiation Policy

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

### 4.2.2.4 Association Acceptance Policy

### 4.2.2.4.1 Real-World Activity – Handling Query and Retrieval Requests

### 4.2.2.4.1.1 Associated Real World 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 Application Entity 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 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.
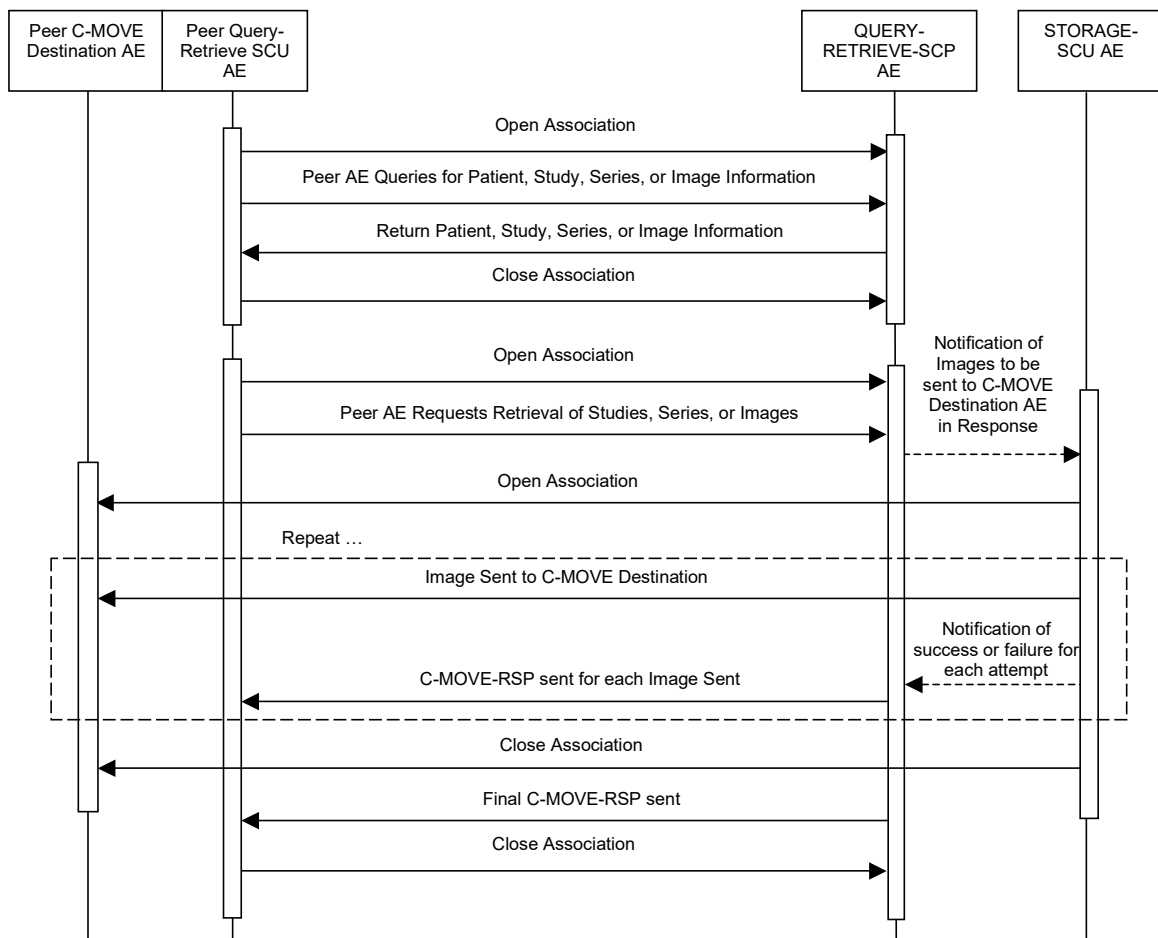
**Figure 4.2-2**

**SEQUENCING OF ACTIVITY – HANDLING QUERY AND RETRIEVAL REQUESTS**

The following sequencing constraints illustrated in Figure 4.2-2 apply to the QUERY-RETRIEVE-SCP AE for handling queries (C-FIND-Requests):

1. Peer AE opens an Association with QUERY-RETRIEVE-SCP.

2.  Peer AE sends a C-FIND-RQ Message

3.  QUERY-RETRIEVE-SCP 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 or C-MOVE Requests can be sent over the Association before it is closed.

The following sequencing constraints illustrated in Figure 4.2-2 apply to the QUERY-RETRIEVE-SCP AE for handling retrievals (C-MOVE-Requests):

1.  Peer AE opens an Association with QUERY-RETRIEVE-SCP.

2.  Peer AE sends a C-MOVE-RQ Message

3.  QUERY-RETRIEVE-SCP 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.  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.

5.  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.

6.  Peer AE closes the Association.   Note that the peer AE does not have to close the Association immediately. Further C-FIND or 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 Table 4.2-12. 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.  1 – DICOM UL service-user

   b.  2 – DICOM UL service-provider (ASCE related function)

   c.  3 – DICOM UL service-provider (Presentation related function)

**Table 4.2-12**

**ASSOCIATION REJECTION REASONS**

| Result | Source | Reason/Diag | Explanation |
|---|---|---|---|
| 2 – rejected-transient | c | 1 – temporary-congestion | The 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 | 2 – local-limit-exceeded | No Associations can be accepted at this time due to insufficient resources. An Association request with the same parameters may succeed at a later time. |
| 1 – rejected-permanent | a | 2 – application-context-name-not-supported | The Association request contained an unsupported Application Context Name.   An association request with the same parameters will not succeed at a later time. |
| 1 – rejected-permanent | a | 7 – called-AE-title-not-Recognized | The Association request contained an unrecognized Called AE Title.   An Association request with the same parameters will not succeed at a later time unless configuration changes are made. This rejection reason normally occurs when the Association initiator is incorrectly configured and attempts to address the Association acceptor using the wrong AE Title. |
| 1 – rejected-permanent | a | 3 – calling-AE-title-not-recognized | The Association request contained an unrecognized Calling AE Title.   An Association request with the same parameters will not succeed at a later time unless configuration changes are made. This rejection reason normally occurs when the Association acceptor has not been configured to recognize the AE Title of the Association initiator. |
| 1 – rejected-permanent | b | 1 – no-reason-given | The Association request could not be parsed.   An Association request with the same format will not succeed at a later time. |

### 4.2.2.4.1.2 Accepted Presentation Contexts

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

**Table 4.2-13**

**ACCEPTED PRESENTATION CONTEXTS BY THE QUERY-RETRIEVE-SCP AE**

| Presentation Context Table | | | | | | |
|---|---|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. | |
| Name | UID | Name | UID | | Neg. | |
| Verification | 1.2.840.10008.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None | |
| Verification | 1.2.840.10008.1.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None | |
| Patient Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | See Note 1 | |
| Patient Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | See Note 1 | |
| Patient Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | See Note 2 | |
| Patient Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | See Note 2 | |
| 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 | SCP | See Note 1 | |
| Study Root Q/R Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | See Note 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 | SCP | See Note 2 | |
| Study Root Q/R Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | See Note 2 | |

Note 1: Accepts Extended Negotiation for Relational-Queries.

Note 2: Accepts Extended Negotiation for Relational-Retrieval.

Retrieve SCP is optional.

### 4.2.2.4.1.3 SOP Specific Conformance for Query SOP Classes

The QUERY-RETRIEVE-SCP AE supports hierarchical queries and relational queries. Two attributes, (0008, 0052) Query/Retrieve Level and (0008,0054) Retrieve AE Title,

are always returned by default. (0008, 0005) Specific Character Set may be returned conditionally, without being requested. Other attributes are returned only when requested in the query identifier. Query responses always return values from the SoliPACS Server database. Exported SOP Instances are always updated with the latest values in the database prior to export. Thus, a change in Patient demographic information will be contained in both the C-FIND Responses and any Composite SOP Instances exported to a C-MOVE Destination AE.

**Patient Root Information Model**

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

**Study Root Information Model**

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

**Table 4.2-14**

**PATIENT ROOT C-FIND SCP SUPPORTED ELEMENTS**

| Level Name<br>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 |
| **Study Level** | | | |
| Study Date | 0008,0020 | DA | S,R,U |
| Study Time | 0008,0030 | TM | R,U |
| Accession Number | 0008,0050 | SH | S,*,U |
| Modalities in Study | 0008,0061 | CS | S,U,L |
| Referring Physician's Name | 0008,0090 | PN | S,*,U |
| Study Description | 0008,1030 | LO | S,*,U |
| Study ID | 0020,0010 | SH | S,*,U |
| Study Instance UID | 0020,000D | UI | S,U,L |
| Number of Study Related Series | 0020,1206 | IS | NONE |
| Number of Study Related Instances | 0020,1208 | IS | NONE |

| **Series Level** | | | |
|---|---|---|---|
| Modality | 0008,0060 | CS | S,U |
| Series Date | 0008,0021 | DA | S,R,U |
| Series Time | 0008,0031 | TM | R,U |
| Series Description | 0008,103E | LO | S,*,U |
| Operator's Name | 0008,1070 | PN | S,*,U |
| Manufacturer's Model Name | 0008,1090 | LO | S,*,U |
| Body Part Examined | 0018,0015 | CS | S,U |
| Protocol Name | 0018,1030 | LO | S,*,U |
| Series Instance UID | 0020,000E | UI | S,U,L |
| Series Number | 0020,0011 | IS | S,*,U |
| Number of Series Related Instances | 0020,1209 | IS | NONE |
| Requested Attribute Sequence | 0040,0275 | SQ | NONE |
| > Scheduled Procedure Step ID | 0040,0009 | SH | S,*,U |
| > Requested Procedure ID | 0040,1001 | SH | S,*,U |
| Performed Procedure Step Start Date | 0040,0244 | DA | S,R,U |
| Performed Procedure Step Start Time | 0040,0245 | TM | R,U |
| **Image Level** | | | |
| SOP Class UID | 0008,0016 | UI | S,U,L |
| SOP Instance UID | 0008,0018 | UI | S,U,L |
| Content Date | 0008,0023 | DA | NONE |
| Content Time | 0008,0033 | TM | NONE |
| Referenced Series Sequence | 0008,1115 | SQ | NONE |
| > Referenced Image Sequence | 0008,1140 | SQ | NONE |
| >> Referenced SOP Class UID | 0008,1150 | UI | NONE |
| >> Referenced SOP Instance UID | 0008,1155 | UI | NONE |
| > Series Instance UID | 0020,000E | UI | NONE |
| Instance Number | 0020,0013 | IS | S,*,U |
| Number of Frames | 0028,0008 | US | NONE |
| Rows | 0028,0010 | US | NONE |
| Columns | 0028,0011 | US | NONE |
| Bits Allocated | 0028,0100 | US | NONE |
| Observation DateTime | 0040,A032 | DT | NONE |
| Concept Name Code Sequence | 0040,A043 | SQ | NONE |
| > Code Value | 0008,0100 | SH | S,*,U |
| > Coding Scheme Designator | 0008,0102 | SH | S,*,U |
| > Coding Scheme Version | 0008,0103 | SH | S,*,U |
| > Code Meaning | 0008,0104 | LO | S,*,U |
| Verifying Observer Sequence | 0040,A073 | SQ | NONE |
| > Verifying Organization | 0040,A027 | LO | NONE |

| > Verification DateTime | 0040,A030 | DT | R,U |
|---|---|---|---|
| > Verifying Observer Name | 0040,A075 | PN | S,*,U |
| > Verifying Observer Identification Code Sequence | 0040,A088 | SQ | NONE |
| Referenced Request Sequence | 0040,A370 | SQ | NONE |
| > Accession Number | 0008,0050 | SH | NONE |
| > Study Instance UID | 0020,000D | UI | NONE |
| > Requested Procedure Code Sequence | 0032,1064 | SQ | NONE |
| > Requested Procedure ID | 0040,1000 | SH | NONE |
| Completion Flag | 0040,A491 | CS | S,U |
| Verification Flag | 0040,A493 | CS | S,U |
| Content Template Sequence | 0040,A504 | SQ | NONE |
| > Template Identifier | 0040,DB00 | CS | S,U |
| Content Label | 0070,0080 | CS | NONE |
| Content Description | 0070,0081 | LO | NONE |
| Presentation Creation Date | 0070,0082 | DA | NONE |
| Presentation Creation Time | 0070,0083 | TM | NONE |
| Presentation Creator's Name | 0070,0084 | PN | NONE |

NOTE:    Patient's Name (0010,0010) matching is case insensitive.

**Table 4.2-15**

**STUDY ROOT C-FIND SCP SUPPORTED ELEMENTS**

| Level Name<br>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 |
| Study Date | 0008,0020 | DA | S,R,U |
| Study Time | 0008,0030 | TM | R,U |
| Accession Number | 0008,0050 | SH | S,*,U |
| Modalities in Study | 0008,0061 | CS | S,U,L |
| Referring Physician's Name | 0008,0090 | PN | S,*,U |
| Study Description | 0008,1030 | LO | S,*,U |
| Study ID | 0020,0010 | SH | S,*,U |
| Study Instance UID | 0020,000D | UI | S,U,L |
| Number of Study Related Series | 0020,1206 | IS | NONE |
| Number of Study Related Instances | 0020,1208 | IS | NONE |

| **Series Level** | | | |
|---|---|---|---|
| Modality | 0008,0060 | CS | S,U |
| Series Date | 0008,0021 | DA | S,R,U |
| Series Time | 0008,0031 | TM | R,U |
| Series Description | 0008,103E | LO | S,*,U |
| Operator's Name | 0008,1070 | PN | S,*,U |
| Manufacturer's Model Name | 0008,1090 | LO | S,*,U |
| Body Part Examined | 0018,0015 | CS | S,U |
| Protocol Name | 0018,1030 | LO | S,*,U |
| Series Instance UID | 0020,000E | UI | S,U,L |
| Series Number | 0020,0011 | IS | S,*,U |
| Number of Series Related Instances | 0020,1209 | IS | NONE |
| Requested Attribute Sequence | 0040,0275 | SQ | NONE |
| > Scheduled Procedure Step ID | 0040,0009 | SH | S,*,U |
| > Requested Procedure ID | 0040,1001 | SH | S,*,U |
| Performed Procedure Step Start Date | 0040,0244 | DA | S,R,U |
| Performed Procedure Step Start Time | 0040,0245 | TM | R,U |
| **Image Level** | | | |
| SOP Class UID | 0008,0016 | UI | S,U,L |
| SOP Instance UID | 0008,0018 | UI | S,U,L |
| Content Date | 0008,0023 | DA | NONE |
| Content Time | 0008,0033 | TM | NONE |
| Referenced Series Sequence | 0008,1115 | SQ | NONE |
| > Referenced Image Sequence | 0008,1140 | SQ | NONE |
| >> Referenced SOP Class UID | 0008,1150 | UI | NONE |
| >> Referenced SOP Instance UID | 0008,1155 | UI | NONE |
| > Series Instance UID | 0020,000E | UI | NONE |
| Instance Number | 0020,0013 | IS | S,*,U |
| Number of Frames | 0028,0008 | US | NONE |
| Rows | 0028,0010 | US | NONE |
| Columns | 0028,0011 | US | NONE |
| Bits Allocated | 0028,0100 | US | NONE |
| Observation DateTime | 0040,A032 | DT | NONE |
| Concept Name Code Sequence | 0040,A043 | SQ | NONE |
| > Code Value | 0008,0100 | SH | S,*,U |
| > Coding Scheme Designator | 0008,0102 | SH | S,*,U |
| > Coding Scheme Version | 0008,0103 | SH | S,*,U |
| > Code Meaning | 0008,0104 | LO | S,*,U |
| Verifying Observer Identification Code Sequence | 0040,A073 | SQ | NONE |
| > Verifying Organization | 0040,A027 | LO | NONE |

| | | | |
|---|---|---|---|
| > Verifying DateTime | 0040,A030 | DT | R,U |
| > Verifying Observer Name | 0040,A075 | PN | S,*,U |
| > Verifying Observer Identification Code Sequence | 0040,A088 | SQ | NONE |
| Referenced Request Sequence | 0040,A370 | SQ | NONE |
| > Accession Number | 0008,0050 | SH | NONE |
| > Study Instance UID | 0020,000D | UI | NONE |
| > Requested Procedure Code Sequence | 0032,1064 | SQ | NONE |
| > Requested Procedure ID | 0040,1001 | SH | NONE |
| Current Requested Procedure Evidence Sequence | 0040,A375 | SQ | NONE |
| > Referenced Series Sequence | 0008,1115 | SQ | NONE |
| >> Referenced SOP Sequence | 0008,1199 | SQ | NONE |
| >>> Referenced SOP Class UID | 0008,1150 | UI | NONE |
| >>> Referenced SOP Instance UID | 0008,1155 | UI | NONE |
| >> Series Instance UID | 0020,000E | UI | NONE |
| > Study Instance UID | 0020,000D | UI | NONE |
| Completion Flag | 0040,A491 | CS | S,U |
| Verification Flag | 0040,A493 | CS | S,U |
| Content Template Sequence | 0040,A504 | SQ | NONE |
| > Template Identifier | 0040,DB00 | CS | S,U |
| Content Label | 0070,0080 | CS | NONE |
| Content Description | 0070,0081 | LO | NONE |
| Presentation Creation Date | 0070,0082 | DA | NONE |
| Presentation Creation Time | 0070,0083 | TM | NONE |
| Presentation Creator's Name | 0070,0084 | PN | NONE |

NOTE:    Patient's Name (0010,0010) matching is case insensitive.


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. An "S" indicates the identifier attribute can specify Single Value Matching, an "R" will indicate Range Matching, a "*" will denote wildcard matching, a '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 4.2-16**

**QUERY-RETRIEVE-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 | System reached the limit in resource usage.<br><br>Error message is output to the Communication Log. |
| 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.<br><br>Error message is output to the Communication Log. |
| | Unable to process | C000 | The C-FIND query identifier is valid for the specified SOP Class but cannot be used to query the database.<br><br>Error message is output to the Communication 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. |
| | Matches are continuing but one or more Optional Keys were not supported. | FF01 | 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 there are Optional keys in the query identifier that are not supported. |

### 4.2.2.4.1.4 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 Application Entity named by the external RETRIEVE-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 RETRIEVE-SCU. One or more of the Image Storage Presentation Contexts listed in Table 4.2-5 will be negotiated.

The QUERY-RETRIEVE-SCP AE can support lists of UIDs in the C-MOVE Request at the Study, Series, and Image Levels. The list of UIDs must be at the Level of the C-MOVE Request however. For example, if the C-MOVE Request is for Series Level retrieval but the identifier contains a list of Study UIDs then the C-MOVE Request will be rejected, and the A900 Failed Status Code will be returned in the C-MOVE Response.

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 RETRIEVE-SCU after the STORAGE-SCU AE has attempted to send each image. This response reports the number of remaining SOP Instances to transfer, and the number transferred having a successful, failed, or warning status.

**Table 4.2-17**

**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. Returned if the server's database is not functioning so the search for matches to the C-MOVE Request cannot be found. Error message is output to the Communication 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 Communication Log. |
| | Move destination unknown | A801 | The Destination Application Entity named in the C-MOVE Request is unknown to Query-Retrieve SCP AE. Error message is output to the Communication Log. |
| Failed | Unable to Process | C000 | The C-MOVE identifier is valid for the specified SOP Class but cannot be used to query the database. Error message is output to the Communication Log. |
| Warning | Sub-operations Complete – One or more Failures | B000 | Some but not all the Composite SOP Instances have been successfully sent to the C-MOVE Destination AE. |
| Cancel | Matching terminated due to Cancel Request | FE00 | The RETRIEVE-SCU sent a Cancel Request. This has been acknowledged and the export of Composite SOP Instances to the C-MOVE Destination AE has been halted. |
| 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. |

**Table 4.2-18**

**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.<br><br>Error message is output to the Communication Log. If the STORAGE-SCU AE is still exporting Composite SOP Instances as a result of an earlier C-MOVE Request received on this Association, it will continue attempting to complete the entire C-MOVE Request. |
| 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.<br><br>Error message is output to the Communication Log. If the STORAGE-SCU AE is still exporting Composite SOP Instances as a result of an earlier C-MOVE Request received on this Association, it will continue attempting to complete the entire C-MOVE Request. |
| Association aborded by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure) | Error message is output to the Communication Log. If the STORAGE-SCU AE is still exporting Composite SOP Instances as a result of an earlier C-MOVE Request received on this Association, it will continue attempting to complete the entire C-MOVE Request. |

### 4.2.3 STORAGE-SCP Application Entity Specification

### 4.2.3.1 SOP Classes

The STORAGE-SCP AE provides Standard Conformance to the following DICOM V3.0 SOP Classes:

**Table 4.2-19 SOP CLASSES FOR STORAGE-SCP AE**

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Verification | 1.2.840.10008.1.1 | Yes | 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 X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.1.1 | No | Yes |
| Digital Mammography X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | No | Yes |
| Digital Mammography X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | No | Yes |
| Digital Intra-oral X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.3 | No | Yes |
| Digital Intra-oral X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.3.1 | 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 Storage (Retired) | 1.2.840.10008.5.1.4.1.1.3 | No | Yes |
| US Multi-frame 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 |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 | No | Yes |
| Nuclear Medicine Image Storage (Retied) | 1.2.840.10008.5.1.4.1.1.5 | No | Yes |
| US Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 | No | Yes |
| US Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | 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 Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 | No | Yes |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | No | Yes |

| | | | |
|---|---|---|---|
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 | No | Yes |
| General ECG Waveform Strage | 1.2.840.10008.5.1.4.1.1.9.1.2 | No | Yes |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 | No | Yes |
| Hemodynamic Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.2.1 | No | Yes |
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 | No | Yes |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 | No | Yes |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 | No | Yes |
| Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.2 | No | Yes |
| Pseudo-Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.3 | No | Yes |
| Blending Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.4 | No | Yes |
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 | No | Yes |
| X-Ray Radiofluoroscopic Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 | No | Yes |
| X-Ray Angiographic Bi-Plane Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.12.3 | No | Yes |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 | No | Yes |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 | No | Yes |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | No | Yes |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 | No | Yes |
| Deformable Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.3 | No | Yes |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 | No | Yes |
| Real World Value Mapping Storage | 1.2.840.10008.5.1.4.1.1.67 | No | Yes |
| VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 | No | Yes |
| Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | No | Yes |
| VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 | No | Yes |
| Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 | No | Yes |
| VL Slide-Coordinates Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.3 | No | Yes |
| VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 | No | Yes |
| Video Photometric Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 | No | Yes |
| Opthalomic Photography 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | No | Yes |
| Opthalomic Photography 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 | No | Yes |
| Basic Text SR | 1.2.840.10008.5.1.4.1.1.88.11 | No | Yes |

| Enhanced SR | 1.2.840.10008.5.1.4.1.1.88.22 | No | Yes |
|---|---|---|---|
| Comprehensive SR | 1.2.840.10008.5.1.4.1.1.88.33 | No | Yes |
| Procedure Log Storage | 1.2.840.10008.5.1.4.1.1.88.40 | No | Yes |
| Mammography CAD SR | 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 |
| Chest CAD SR | 1.2.840.10008.5.1.4.1.1.88.65 | No | Yes |
| X-Ray Radiation Dose SR | 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 |
| Positron Emission Tomography Image | 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 Brachy Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.6 | No | Yes |
| RT Treatment Summary Record Storage | 1.2.840.10008.5.1.4.1.1.481.7 | No | Yes |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 | No | Yes |
| RT Icon Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.9 | No | Yes |

### 4.2.3.2 Association Establishment Policies

### 4.2.3.2.1 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 4.2-20**

**DICOM APPLICATION CONTEXT FOR STORAGE-SCP AE**

| Application Context Name | 1.2.840.10008.3.1.1.1 |
|---|---|

### 4.2.3.2.2 Number of Associations

The STORAGE-SCP AE can support multiple simultaneous Associations requested by peer AEs.   Each time the STORAGE-SCP AE receives an Association, a child process will be spawned to process the Verification, Storage, or Storage Commitment Push

Model Service requests. The maximum number of child processes, and thus the maximum number of simultaneous Associations that can be processed, is 64 in total. The STORAGE-SCP AE initiates one Association at a time for sending Storage Commitment Push Model N-EVENT-REPORTs to peer AEs.

**Table 4.2-21**

**NUMBER OF SIMULTANEOUS ASSOCIATIONS AS AN SCP FOR STORAGE-SCP AE**

| | |
|---|---|
| Maximum number of simultaneous Associations requested by peer AEs | 64 |
| Maximum number of simultaneous Associations proposed by STORAGE-SCP AE | 1 |

### 4.2.3.2.3 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 4.2-22**

**ASYNCHRONOUS NATURE AS A SCP FOR STORAGE-SCP AE**

| | |
|---|---|
| Maximum number of outstanding asynchronous transactions | 1 |

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 4.2-23**

**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 |

### 4.2.3.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

**Table 4.2-24**

**DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE-SCP AE**

| | |
|---|---|
| Implementation Class UID | 1.2.840.113820.60 |
| Implementation Version Name | EBM_DICOM_30 |

Note that All SoliPACS Server AE's use the same Implementation Class UID and the same Implementation Version Name.

### 4.2.3.3 Association Initiation Policy

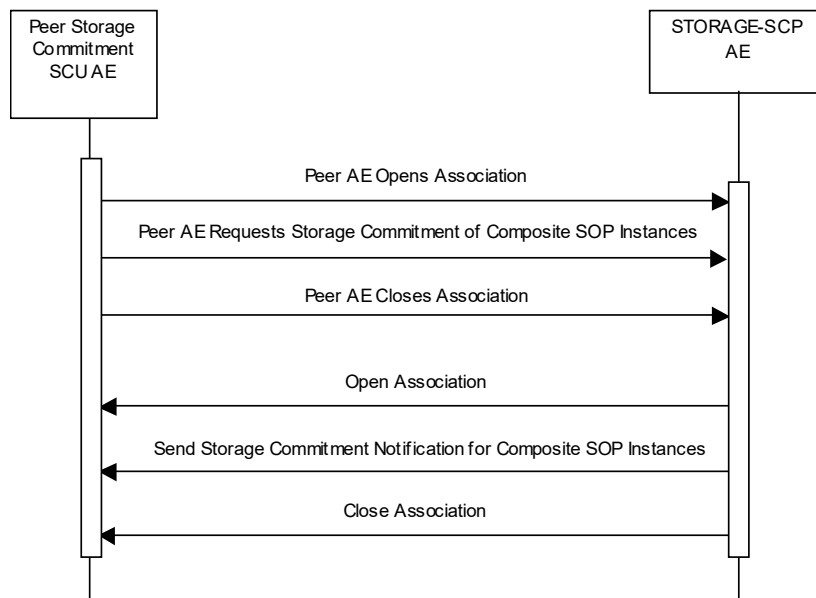### 4.2.3.3.1 Activity – Send Storage Commitment Notification over new Association

### 4.2.3.3.1.1 Description and Sequencing of Activity

The STORAGE-SCP AE will initiate a new Association if a Storage Commitment Push Model Notification (N-EVENT-REPORT) cannot be sent back over the original Association used to send the corresponding request. A new Association will always be requested by the STORAGE-SCP AE in such cases even if the peer AE requests another Association after the original has been closed (i.e. A peer AE opens an Association and sends some Storage requests and a Storage Commitment Push Model request. Before the STORAGE-SCP AE can send the Storage Commitment Push Model N-EVEN-REPORT the Association is closed. The peer AE then opens another Association and begins to send Storage requests. In such a case the STORAGE-SCP AE will always initiate a new Association to send the N-EVENT-REPORT even though it could send the N-EVENT-REPORT over the new Association opened by the peer AE).

An Association Request is sent to the peer AE that sent the Storage Commitment Push Model request and upon successful negotiation of the required Presentation Context the outstanding N-EVENT-REPORT is sent. If there are multiple outstanding N-EVENT-REPORTs to be sent to a single peer AE then the STORAGE-SCP AE will attempt to send them all over a single Association rather than requesting a new Association for each one. The Association will be released when all the N-EVENT-REPORTs for the peer AE have been sent. If any type of error occurs during transmission (either a communication failure or indicated by a Status Code returned by the peer AE) over an open Association then the transfer of N-EVENT-REPORTs is halted.

If the STORAGE-SCP AE sends a Notification request (N-EVENT-REPORT-RQ) over the original Association opened by the peer AE but receives a request to close the Association rather than a response to the Notification (N-EVENT-REPORT-RSP) then this is handled in the same way as if the request to close the Association had been received before trying to send the Notification request.   Thus, the STORAGE-SCP AE will then open a new Association to resend the Notification request.



**Figure 4.2-3**
**SEQUENCING OF ACTIVITY – SEND STORAGE**
**COMMITMENT NOTIFICATION OVER NEW ASSOCIATION**

The following sequencing constraints illustrated in Figure 4.2-3 apply to the STORAGE-SCP for handling Storage Commitment Push Model Requests using a new Association:

1. Peer AE opens an Association with STORAGE-SCP.

2. 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).

3. Peer AE closes the Association before the STORAGE-SCP AE can successfully send the Storage Commitment Push Model Notification (N-EVENT-REPORT-RQ).

4. STORAGE-SCP AE opens an Association with the peer AE.

5.  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.

6.  STORAGE-SCP AE closes the Association with the peer AE.

The Verification Service as an SCU is only supported as a utility function for Service staff.   It is used only as a diagnostic tool when the STORAGE-SCP AE is failing to open new Associations to send N-EVENT-REPORTs to peer AEs.

### 4.2.3.3.1.2 Proposed Presentation Contexts

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

**Table 4.2-25**

**PROPOSED 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 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Verification | 1.2.840.10008.1.1 | Emplicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | SCP Role |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | SCP Role |

### 4.2.3.3.1.3 SOP Specific Conformance for Storage SOP Classes

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 safely store Composite SOP Instances that have been sent to it.   It thus allows peer AEs to determine whether the SoliPACS Server has taken responsibility for the archiving of specific SOP Instances.

The STORAGE-SCP AE will initiate a new Association to a peer AE that sent a Storage Commitment Push Model request, if the original Association over which this was sent is no longer open.   For a detailed explanation of the SOP specific Behavior of the STORAGE-SCP AE in this case please refer to 4.2.3.4.1.5, Storage Commitment Push Model as an SCP.

**4.2.3.3.1.4 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. It can be used to test whether Associations can actually be opened with a peer AE that is issuing Storage Commitment Push Model requests (i.e. to test whether the indicated TCP/IP port and AE Title for sending N-EVENT-REPORT Requests to the peer AE are truly functional).

**4.2.3.4 Association Acceptance Policy**

**4.2.3.4.1 Real-World Activity – Receive Images and Storage Commitment Requests**

**4.2.3.4.1.1 Associated Real World 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 Application Entity Titles.

The behavior of the STORAGE-SCP AE is to always attempt to send a Storage Commitment Push Model Notification (N-EVENT-REPORT) over the same Association opened by the peer AE to send the request (N-ACTION). If the STORAGE-SCP AE receives a request to close the Association either before sending the Notification or before receiving the corresponding N-EVENT-REPORT-RSP then it will open a new Association to send the Notification. Refer to section 4.2.3.4.1.5 for the details.
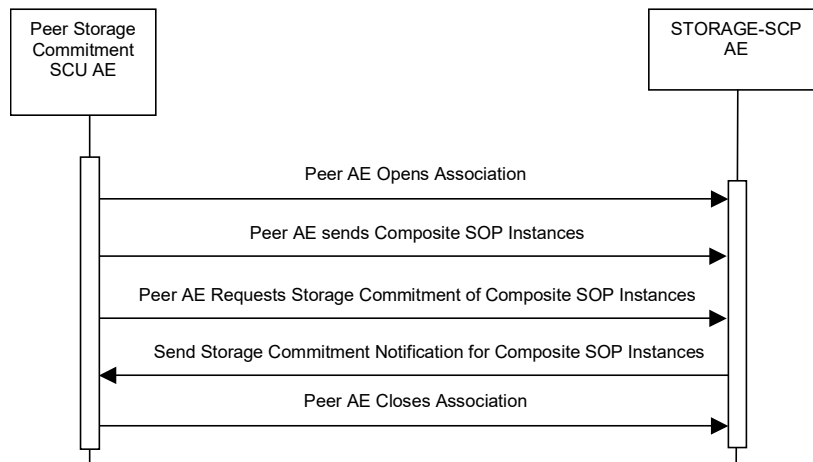
**Figure 4.2-4**
**SEQUENCING OF ACTIVITY – RECEIVE IMAGES**
**AND STORAGE COMMITMENT REQUESTS**

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

1. Peer AE opens an Association with STORAGE-SCP.

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. STORAGE-SCP AE sends Storage Commitment Push Model Notification request (N-EVENT-REPORT-RQ) and successfully receives Notification response (N-EVENT-REPORT-RSP) from peer AE.

5. Peer AE closes the Association.


If the STORAGE-SCP AE receives a request to close the Association from the peer AE before sending the Notification request (N-EVENT-REPORT-RQ) or when expecting to receive a Notification response (N-EVENT-REPORT-RSP) then it will open a new Association to send (or resend) the Notification.

The STORAGE-SCP AE may reject Association attempts as shown in Table 4.2-26. 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:

1 – DICOM UL service-user

2 – DICOM UL service-provider (ASCE related function)

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

**Table 4.2-26**

**ASSOCIATION REJECTION REASONS**

| Result | Source | Reason/Diag | Explanation |
|---|---|---|---|
| 2 – rejected-transient | c | 1 – temporary-congestion | The 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 | 2 – local-limit-exceeded | No Associations can be accepted at this time due to insufficient resources. An Association request with the same parameters may succeed at a later time. |
| 1 – rejected-permanent | a | 2 – application-context-name-not-supported | The Association request contained an unsupported Application Context Name. An association request with the same parameters will not succeed at a later time. |
| 1 – rejected-permanent | a | 7 – called-AE-title-not-Recognized | The Association request contained an unrecognized Called AE Title. An Association request with the same parameters will not succeed at a later time unless configuration changes are made. This rejection reason normally occurs when the Association initiator is incorrectly configured and attempts to address the Association acceptor using the wrong AE Title. |
| 1 – rejected-permanent | a | 3 – calling-AE-title-not-recognized | The Association request contained an unrecognized Calling AE Title. An Association request with the same parameters will not succeed at a later time unless configuration changes are made. This rejection reason normally occurs when the Association acceptor has not been configured to recognize the AE Title of the Association initiator. |
| 1 – rejected-permanent | b | 1 – no-reason-given | The Association request could not be parsed. An Association request with the same format will not succeed at a later time. |

## 4.2.3.4.1.2      Accepted Presentation Contexts

The STORAGE-SCP AE supports the Implicit VR Little Endian and Explicit VR Little Endian Transfer Syntaxes for all Abstract Syntaxes. In addition, various compression syntaxes are supported for all Image Object Storage.

The STORAGE-SCP AE can be configured to accept only Little Endian Transfer Syntaxes from certain Application Entity Titles.

If multiple Transfer Syntaxes are proposed per Presentation Context, then only the first supported Transfer Syntax is accepted.

Any of the Presentation Contexts shown in the following table are acceptable to the STORAGE-SCP AE for receiving images.

**Table 4.2-27**

**ACCEPTED PRESENTATION CONTEXTS BY STORAGE-SCP AE**

| Presentation Context Table | | | | |
|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
| Name | UID | Table | | |
| Verification | 1.2.840.10008.1.1 | 4.2-27.1 | SCP | None |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | 4.2-27.1 | SCP | None |
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 | 4.2-27.2 | SCP | None |
| Digital X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.1 | 4.2-27.2 | SCP | None |
| Digital X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.1.1 | 4.2-27.2 | SCP | None |
| Digital Mammography X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | 4.2-27.2 | SCP | None |
| Digital Mammography X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | 4.2-27.2 | SCP | None |
| Digital Intra-oral X-Ray Image Storage – For Presentation | 1.2.840.10008.5.1.4.1.1.1.3 | 4.2-27.2 | SCP | None |
| Digital Intra-oral X-Ray Image Storage – For Processing | 1.2.840.10008.5.1.4.1.1.1.3.1 | 4.2-27.2 | SCP | None |
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 | 4.2-27.2 | SCP | None |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 | 4.2-27.2 | SCP | None |
| US Multi-frame Storage (Retired) | 1.2.840.10008.5.1.4.1.1.3 | 4.2-27.2 | SCP | None |
| US Multi-frame Storage | 1.2.840.10008.5.1.4.1.1.3.1 | 4.2-27.2 | SCP | None |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | 4.2-27.2 | SCP | None |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | 4.2-27.2 | SCP | None |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 | 4.2-27.2 | SCP | None |
| Nuclear Medicine Image Storage (Retied) | 1.2.840.10008.5.1.4.1.1.5 | 4.2-27.2 | SCP | None |
| US Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 | 4.2-27.2 | SCP | None |
| US Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | 4.2-27.2 | SCP | None |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | 4.2-27.2 | SCP | None |

| Presentation Context Table | | | | |
|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 | 4.2-27.2 | SCP | None |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 | 4.2-27.2 | SCP | None |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | 4.2-27.2 | SCP | None |
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 | 4.2-27.1 | SCP | None |
| General ECG Waveform Strage | 1.2.840.10008.5.1.4.1.1.9.1.2 | 4.2-27.1 | SCP | None |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 | 4.2-27.1 | SCP | None |
| Hemodynamic Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.2.1 | 4.2-27.1 | SCP | None |
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 | 4.2-27.1 | SCP | None |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 | 4.2-27.1 | SCP | None |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 | 4.2-27.1 | SCP | None |
| Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.2 | 4.2-27.1 | SCP | None |
| Pseudo-Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.3 | 4.2-27.1 | SCP | None |
| Blending Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.2 | 4.2-27.1 | SCP | None |
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 | 4.2-27.2 | SCP | None |
| X-Ray Radiofluoroscopic Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 | 4.2-27.2 | SCP | None |
| X-Ray Angiographic Bi-Plane Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.12.3 | 4.2-27.2 | SCP | None |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 | 4.2-27.2 | SCP | None |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 | 4.2-27.1 | SCP | None |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | 4.2-27.1 | SCP | None |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 | 4.2-27.1 | SCP | None |

| Presentation Context Table | | | | |
|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | **Role** | **Ext. Neg.** |
| Deformable Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.3 | 4.2-27.1 | SCP | None |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 | 4.2-27.1 | SCP | None |
| Real World Value Mapping Storage | 1.2.840.10008.5.1.4.1.1.67 | 4.2-27.1 | SCP | None |
| VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 | 4.2-27.2 | SCP | None |
| Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | 4.2-27.2 | SCP | None |
| VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 | 4.2-27.2 | SCP | None |
| Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 | 4.2-27.2 | SCP | None |
| VL Slide-Coordinates Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.3 | 4.2-27.2 | SCP | None |
| VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 | 4.2-27.2 | SCP | None |
| Video Photometric Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 | 4.2-27.2 | SCP | None |
| Opthalomic Photography 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 | 4.2-27.2 | SCP | None |
| Opthalomic Photography 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 | 4.2-27.2 | SCP | None |
| Basic Text SR | 1.2.840.10008.5.1.4.1.1.88.11 | 4.2-27.1 | SCP | None |
| Enhanced SR | 1.2.840.10008.5.1.4.1.1.88.22 | 4.2-27.1 | SCP | None |
| Comprehensive SR | 1.2.840.10008.5.1.4.1.1.88.33 | 4.2-27.1 | SCP | None |
| Procedure Log Storage | 1.2.840.10008.5.1.4.1.1.88.40 | 4.2-27.1 | SCP | None |
| Mammography CAD SR | 1.2.840.10008.5.1.4.1.1.88.50 | 4.2-27.1 | SCP | None |
| Key Object Selection Document | 1.2.840.10008.5.1.4.1.1.88.59 | 4.2-27.1 | SCP | None |
| Chest CAD SR | 1.2.840.10008.5.1.4.1.1.88.65 | 4.2-27.1 | SCP | None |
| X-Ray Radiation Dose SR | 1.2.840.10008.5.1.4.1.1.88.67 | 4.2-27.1 | SCP | None |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 | 4.2-27.1 | SCP | None |
| Positron Emission Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.128 | 4.2-27.2 | SCP | None |
| RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 | 4.2-27.2 | SCP | None |
| RT Dose Storage | 1.2.840.10008.5.1.4.1.1.481.2 | 4.2-27.1 | SCP | None |
| RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 | 4.2-27.1 | SCP | None |

| Presentation Context Table | | | | |
| --- | --- | --- | --- | --- |
| Abstract Syntax | | Transfer Syntax | Role | Ext. Neg. |
| RT Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.4 | 4.2-27.1 | SCP | None |
| RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 | 4.2-27.1 | SCP | None |
| RT Brachy Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.6 | 4.2-27.1 | SCP | None |
| RT Treatment Summary Record Storage | 1.2.840.10008.5.1.4.1.1.481.7 | 4.2-27.1 | SCP | None |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 | 4.2-27.1 | SCP | None |
| RT Icon Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.9 | 4.2-27.1 | SCP | None |

**Table 4.2-27.1**

**TRANSFER SYNTAX COMBINATION FOR NON-IMAGE STORAGE SOP CLASSES**

| Transfer Syntax | |
| --- | --- |
| Name | UID |
| Implicit VR Little Endian | 1.2.840.10008.1.2 |
| Explicit VR Little Endian | 1.2.840.10008.1.2.1 |

**Table 4.2-27.2**

**TRANSFER SYNTAX COMBINATION FOR IMAGE STORAGE SOP CLASSES**

| Transfer Syntax | |
| --- | --- |
| Name | UID |
| Implicit VR Little Endian | 1.2.840.10008.1.2 |
| Explicit VR Little Endian | 1.2.840.10008.1.2.1 |
| JPEG 8 Bit Image Compression | 1.2.840.10008.1.2.4.50 |
| JPEG 12 Bit Image Compression | 1.2.840.10008.1.2.4.51 |
| JPEG Lossless Image Compression | 1.2.840.10008.1.2.4.70 |
| JPEG 2000 Image Compression (Lossless Only) | 1.2.840.10008.1.2.4.90 |
| JPEG 2000 Image Compression | 1.2.840.10008.1.2.4.91 |
| RLE Lossless | 1.2.840.10008.1.2.5 |

### 4.2.3.4.1.3 SOP Specific Conformance for Verification SOP Class

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

### 4.2.3.4.1.4 SOP Specific Conformance for Storage SOP Classes

The associated Real-World 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.

The STORAGE-SCP AE does not have any dependencies on the number of Associations used to send images to it. Images belonging to more than one Study or Series can be sent over a single or multiple Associations. Images belonging to a single Study or Series can also be sent over different Associations. There is no limit on either the number of SOP Instances or the maximum amount of total SOP Instance data that can be transferred over a single Association.

The STORAGE-SCP AE is configured to retain the original DICOM data in DICOM Part 10 compliant file format. The STORAGE-SCP AE is Level 2 (Full) conformant as a Storage SCP. In addition, all Private and SOP Class Extended Elements are maintained in the DICOM format files. In addition to saving all Elements in files, a subset of the Elements are stored in the SoliPACS Server database to support query and retrieval requests and also allow updating of Patient, Study, and Series information by user input, or demographic and Study related messages.

The Behavior for handling duplicate SOP Instances is configurable. The default Behavior is to ignore duplicated SOP Instances. An alternative configuration is possible that causes the original object with the conflicting SOP Instance UID to be replaced by the new SOP Instance.

**Table 4.2-28**

**STORAGE-SCP AE C-STORE RESPONSE STATUS RETURN BEHAVIOR**

| Service Status | Further Meaning | Error Code | Behavior |
|---|---|---|---|
| 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 or resource to process storage. Error message is output to the Communication 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. Error message is output to the Communication Log. |
|---|---|---|---|

NOTE:     If a failure condition does occur when handling an Association then all images previously received successfully over the Association are maintained in the SoliPACS Server database. No previously successfully received images are discarded. Even if an image is successfully received but an error occurs transmitting the C-STORE Response then this final image is maintained rather than discarded. If the loss of an Association is detected then the Association is closed.


NOTE:     Warning Status, B000, B007 and B006 are never returned.


The Behavior of STORAGE-SCP AE during communication failure is summarized in the following table:

**Table 4.2-29**

**STORAGE-SCP AE Storage Service 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 C-STORE Request on an open Association but the timer expires. | The Association is aborted by issuing a DICOM A-ABORT.<br><br>Error message is output to the Communication Log.   If some Composite SOP Instances have already been successfully received then they are maintained in the database.   They are not automatically discarded because of a later failure. |
| Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout). I.e. The STORAGE-SCP AE is waiting for the next C-STORE Data Set PDU but the timer expires. | The Association is aborted by issuing a DICOM A-ABORT.<br><br>Error message is output to the Communication Log.   If a C-STORE Data Set has not been fully received then the data already received is discarded.   If some Composite SOP Instances have already been successfully received over the Association then they are maintained in the database. |
| 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 Communication Log.   If some Composite SOP Instances have already been successfully received then they are maintained in the database.   They are not automatically discarded because of a later failure. |

**4.2.3.4.1.5 SOP Specific Conformance for Storage Commitment Push Model 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 SoliPACS Server has taken responsibility for the archiving of specific SOP Instances.

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 SoliPACS Server 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 same Association that was used by the peer AE to send the original N-ACTION Request. If the Association has already been released or Message transfer fails for some reason then the STORAGE-SCP AE will attempt to send the N-EVENT-REPORT-RQ over a new Association. The STORAGE-SCP AE will request a new Association with the peer AE that made the original N-ACTION Request. The STORAGE-SCP AE can be configured to always open a new Association in order to send the Notification 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 SoliPACS Server. 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.

With default setting, the SoliPACS Server does not automatically delete 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 SoliPACS Server 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 4.2-30 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 X-Ray Image Storage – For Processing |
| Digital Mammography X-Ray Image Storage – For Presentation |
| Digital Mammography X-Ray Image Storage – For Processing |
| Digital Intra-oral X-Ray Image Storage – For Presentation |

| |
|---|
| Digital Intra-oral X-Ray Image Storage – For Processing |
| CT Image Storage |
| Enhanced CT Image Storage |
| US Multi-frame Storage (Retired) |
| US Multi-frame Storage |
| MR Image Storage |
| Enhanced MR Image Storage |
| MR Spectroscopy Storage |
| Nuclear Medicine Image Storage (Retied) |
| US Image Storage (Retired) |
| US Image Storage |
| Secondary Capture Image Storage |
| Multi-frame Grayscale Byte Secondary Capture Image Storage |
| Multi-frame Grayscale Word Secondary Capture Image Storage |
| Multi-frame True Color Secondary Capture Image Storage |
| 12-lead ECG Waveform Storage |
| General ECG Waveform Strage |
| Ambulatory ECG Waveform Storage |
| Hemodynamic Waveform Storage |
| Cardiac Electrophysiology Waveform Storage |
| Basic Voice Audio Waveform Storage |
| Grayscale Softcopy Presentation State Storage |
| Color Softcopy Presentation State Storage |
| Pseudo-Color Softcopy Presentation State Storage |
| Blending Softcopy Presentation State Storage |
| X-Ray Angiographic Image Storage |
| X-Ray Radiofluoroscopic Image Storage |
| X-Ray Angiographic Bi-Plane Image Storage (Retired) |
| Nuclear Medicine Image Storage |
| Raw Data Storage |
| Spatial Registration Storage |
| Spatial Fiducials Storage |
| Deformable Segmentation Storage |
| Segmentation Storage |
| Real World Value Mapping Storage |
| VL Endoscopic Image Storage |
| Video Endoscopic Image Storage |
| VL Microscopic Image Storage |

| |
|---|
| Video Microscopic Image Storage |
| VL Slide-Coordinates Microscopic Image Storage |
| VL Photographic Image Storage |
| Video Photometric Image Storage |
| Opthalomic Photography 8 Bit Image Storage |
| Opthalomic Photography 16 Bit Image Storage |
| Basic Text SR |
| Enhanced SR |
| Comprehensive SR |
| Procedure Log Storage SOP Class |
| Mammography CAD SR |
| Key Object Selection Document |
| Chest CAD SR |
| X-Ray Radiation Dose SR SOP Class |
| Encapsulated PDF Storage |
| Positron Emission Tomography Image Storage |
| RT Image Storage |
| RT Dose Storage |
| RT Structure Set Storage |
| RT Beams Treatment Record Storage |
| RT Plan Storage |
| RT Brachy Treatment Record Storage |
| RT Treatment Summary Record Storage |
| RT Ion Plan Storage |
| RT Icon Beams Treatment Record Storage |

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

**Table 4.2-31**

**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. |
| Error | Processing Failure | 0110 | Indicates that the Storage Commitment Push Model N-ACTION Request cannot be parsed or fully processed due to a database or system failure. |
| | No such object instance | 0112 | Indicates that the Storage Commitment Push Model N-ACTION Request cannot be processed because one or more of the elements in the Referenced SOP Instance Sequence was not available. |
| | Class /Instance Conflict | 0119 | Indicates that the Storage Commitment Push Model N-ACTION Request cannot be processed 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 SCP. |
| | Referenced SOP Class not supported | 0122 | Indicates that the Storage Commitment Push Model N-ACTION Request cannot be processed because Storage Commitment has been requested for a SOP Instance with a SOP Class that is not supported by the SCP. |
| | Duplicate Transaction UID | 0131 | Indicates that the Storage Commitment Push Model N-ACTION Request cannot be processed because the Transaction UID of the Storage Commitment Request is already in use. |

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 4.2-32**

**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.<br><br>Success indication message is output to the Communication Logs. |
| Warning | Attribute List Error | 0107 | Transmission of Storage Commitment Push Model N-EVENT-REPORT Request is considered successful.<br><br>Warning indication message is output to the Communication Logs. |
|  | Attribute Value Out of Range | 0116 | Transmission of Storage Commitment Push Model N-EVENT-REPORT Request is considered successful.<br><br>Warning indication message is output to the Communication Logs. |
| * | * | Any other status code. | Transmission of Storage Commitment Push Model N-EVENT-REPORT Request will not be re-transmitted.<br><br>Error indication message is output to the Communication Logs. |

**Table 4.2-33**

**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. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is output to the Communication Logs. |
| 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. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is output to the Communication Logs. |
| 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. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is output to the Communication Logs. |
| 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. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is output to the Communication Logs. |

### 4.2.4 QUERY-SCU Application Entity Specification

### 4.2.4.1 SOP Classes

QUERY-SCU provides Standard Conformance to the following SOP Class:

**Table 4.2-34**

**SOP CLASSES SUPPORTED BY QUERY-SCU**

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Study Root Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Yes | No |

### 4.2.4.2 Association Policies

### 4.2.4.2.1 General

QUERY-SCU initiates but never accepts associations.

**Table 4.2-35**

**MAXIMUM PDU SIZE RECEIVED AS A SCP FOR QUERY-SCU**

| Maximum PDU size received | 64k bytes |
|---|---|

### 4.2.4.2.2 Number of Associations

**Table 4.2-36**

**NUMBER OF ASSOCIATIONS AS A SCP FOR QUERY-SCU**

| Maximum number of simultaneous associations | 1 |
|---|---|

### 4.2.4.2.3 Asynchronous Nature

QUERY-SCU will only allow a single outstanding operation on an Association. Therefore, QUERY-SCU will not perform asynchronous operations window negotiation.

### 4.2.4.2.4 Implementation Identifying Information

**Table 4.2-37**

**DICOM IMPLEMENTATION CLASS AND VERSION FOR QUERY-SCU**

| Implementation Class UID | 1.2.840.113820.60 |
|---|---|
| Implementation Version Name | EBM_DICOM_30 |

### 4.2.4.3 Association Initiation Policy

QUERY-SCU attempts to initiate a new association when the user performs the query action from the user interface. If this involves recursive queries for lower query levels in the hierarchy, these will be performed on the same association.

**4.2.4.3.1 Activity – Query Remote AE**

**4.2.4.3.1.1 Description and Sequencing of Activities**

A single attempt will be made to query the remote AE. If the query fails, for whatever reason, no retry will be performed.

**4.2.4.3.1.2 Proposed Presentation Contexts**

**Table 4.2-38**

**PROPOSED PRESENTATION CONTEXTS FOR QUERY-SCU AND QUERY REMOTE AE**

| Presentation Context Table | | | | | | |
|---|---|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | | Role | Extended | |
| Name | UID | Name | UID | | Negotiation | |
| Study Root Query/Retrieve Information Model – FIND | 1.2.840.10008 .5.1.4.1.2.2.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | Relational Query | |
| | 1.2.840.10008 .5.1.4.1.2.2.1 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | Relational Query | |

QUERY-SCU will propose a single Presentation Context with all supported Transfer Syntaxes.

**4.2.4.3.1.2.1 Extended Negotiation**

Extended negotiation is performed for relational queries, if user specifies one or more query key attributes at series level.

**4.2.4.3.1.3 SOP Specific Conformance**

**4.2.4.3.1.3.1 SOP Specific Conformance to C-FIND SOP Classes**

QUERY-SCU provides standard conformance to the supported Query SOP Classes. Only a single information model, Study Root, is supported.

If user specifies one or more series level query key, QUERY-SCU negotiates for Relational Query during association establishment. If SCP accepts the Extended Negotiation, QUERY-SCU initiates SERIES level query followed by recursive query consisting of STUDY, SERIES and IMAGE level queries.

If user does not specify any series level query key or SCP rejects Extended Negotiation for Relational Query, then all queries are initiated at the highest level of the information model (the STUDY level), and then for each response received, recursively repeated at the next lower levels (the SERIES and then IMAGE levels), in order to completely elucidate the "tree" of instances available on the remote AE

(from which the user may subsequently request a retrieval at any level).

No CANCEL requests are ever issued.

Requested return attributes not returned by the SCP are ignored. Non-matching responses returned by the SCP due to unsupported (hopefully optional) matching keys are not filtered locally by the QUERY-SCU and thus will still be presented in the browser. No attempt is made to filter out duplicate responses.

Specific Character Set may be included at any query level, if identifier contains multi-byte characters. If present in the response, Specific Character Set will be used to identify character sets other than the default character set for display of strings in the browser.

**Table 4.2-39**

**STUDY ROOT REQUEST IDENTIFIER FOR QUERY-SCU**

| Name | Tag | Type of Matching |
|---|---|---|
| STUDY level | | |
| Patient ID | (0010,0020) | S, *, U |
| Patient's Name | (0010,0010) | S, *, U |
| Patient's Birth Date | (0010,0030) | S, *, U, R |
| Patient's Sex | (0010,0040) | NONE |
| Study ID | (0020,0010) | S, *, U |
| Study Description | (0008,1030) | S, *, U |
| Study Date | (0008,0020) | S, *, U, R |
| Study Time | (0008,0030) | S, *, U, R |
| Referring Physician's Name | (0008,0090) | S, *, U |
| Accession Number | (0008,0050) | S, *, U |
| Study Instance UID | (0020,000D) | UNIQUE |
| SERIES level | | |
| Series Number | (0020,0011) | NONE |
| Series Description | (0008,103E) | NONE |
| Modality | (0008,0060) | S, *, U |
| Body Part Examined | (0018,0015) | S, *, U |
| Series Instance UID | (0020,000E) | UNIQUE |
| IMAGE level | | |
| Instance Number | (0020,0013) | NONE |
| Content Date | (0008,0023) | NONE |
| Content Time | (0008,0033) | NONE |

| | | |
|---|---|---|
| Referenced Series Sequence | (0008,1115) | NONE |
| Number of Frames | (0028,0008) | NONE |
| SOP Instance UID | (0008,0018) | UNIQUE |
| Observation DateTime | (0040,A032) | NONE |
| Concept Name Code Sequence | (0040,A043) | NONE |
| Verifying Observer Sequence | (0040,A073) | NONE |
| Completion Flag | (0040,A491) | NONE |
| Verification Flag | (0040,A493) | NONE |
| Content Template Sequence | (0040,A504) | NONE |
| **Common to all query levels** | | |
| Specific Character Set | (0008,0005) | Note 1) |

The types of Matching supported by the QUERY-SCU:

An "S" indicates the identifier attribute uses Single Value Matching, an "R" indicates Range Matching, an "*" indicates wildcard matching, a 'U' indicates Universal Matching, and an 'L' indicates that UID lists are sent. "NONE" indicates that no matching is supported, but that values for this Element are requested to be returned (i.e. universal matching), and "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.

Note 1)

Specific Character Set (0008,0005) shall not be treated as matching key or return key. Query SCP shall include Specific Character Set (0008,0005) in response, when returning identifier that contains one or more character sets other than DICOM default character set.

QUERY-SCU will behave as described in Table 4.2-40 in response to the status returned in the C-FIND response command message(s).

**Table 4.2-40**

**RESPONSE STATUS FOR QUERY-SCU AND QUERY REMOTE AE REQUEST**

| Service Status | Further Meaning | Status Codes | Behavior |
|---|---|---|---|
| Refused | Out of Resources | A700 | Current query is terminated; remaining queries continue |
| Error | Identifier does not match SOP Class | A900 | Current query is terminated; remaining queries continue |
| | Unable to process | Cxxx | Current query is terminated; remaining queries continue |
| Cancel | Matching terminated due to Cancel request | FE00 | Ignored (should never occur, since cancels never issued) |
| Success | Matching is complete - No final Identifier is supplied | 0000 | Current query is terminated; remaining queries continue |
| Pending | Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys | FF00 | Identifier used to populate browser and trigger recursive lower level queries |
| | Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier | FF01 | Identifier used to populate browser and trigger recursive lower level queries |

### 4.2.4.4 Association Acceptance Policy

QUERY-SCU does not accept associations.

### 4.2.5 RETRIEVE-SCU

### 4.2.5.1 SOP Classes

RETRIEVE-SCU provides Standard Conformance to the following SOP Class:

**Table 4.2-41**

**SOP CLASSES SUPPORTED BY RETRIEVE-SCU**

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|---|---|---|
| Study Root Query/Retrieve Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Yes | No |

### 4.2.5.2 Association Policies

### 4.2.5.2.1 General

RETRIEVE-SCU initiates but never accepts associations.

**Table 4.2-42**

**MAXIMUM PDU SIZE RECEIVED AS A SCP FOR RETRIEVE-SCU**

| Maximum PDU size received | 64k bytes |
|---|---|

### 4.2.5.2.2 Number of Associations

**Table 4.2-43**

**NUMBER OF ASSOCIATIONS AS A SCP FOR RETRIEVE-SCU**

| Maximum number of simultaneous associations | 1 |
|---|---|

### 4.2.5.2.3 Asynchronous Nature

RETRIEVE-SCU will only allow a single outstanding operation on an Association. Therefore, RETRIEVE-SCU will not perform asynchronous operations window negotiation.

### 4.2.5.2.4 Implementation Identifying Information

**Table 4.2-44**

**DICOM IMPLEMENTATION CLASS AND VERSION FOR RETRIEVE-SCU**

| Implementation Class UID | 1.2.840.113820.60 |
|---|---|
| Implementation Version Name | EBM_DICOM_30 |

### 4.2.5.3 Association Initiation Policy

RETRIEVE-SCU attempts to initiate a new association when the user performs the retrieve action from the user interface.

### 4.2.5.3.1 Activity – Retrieve From Remote AE
### 4.2.5.3.1.1 Description and Sequencing of Activities

For the entity (study, series or instance) selected from the user interface to be retrieved, a single attempt will be made to retrieve it from the selected remote AE. If the retrieve fails, for whatever reason, no retry will be performed.

### 4.2.5.3.1.2 Proposed Presentation Contexts

**Table 4.2-45**

**PROPOSED PRESENTATION CONTEXTS FOR RETRIEVE-SCU**

**AND RETRIEVE FROM REMOTE AE**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | | Role | Extended |
| Name | UID | Name | UID | | Negotiation |
| Study Root Query/Retrieve Information Model – MOVE | 1.2.840.10008. 5.1.4.1.2.2.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | 1.2.840.10008. 5.1.4.1.2.2.2 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |

RETRIEVE-SCU will propose a single Presentation Contexts with all of the supported Transfer Syntaxes.

### 4.2.5.3.1.2.1 Extended Negotiation

No extended negotiation is performed.

### 4.2.5.3.1.3 SOP Specific Conformance
### 4.2.5.3.1.3.1 SOP Specific Conformance to C-MOVE SOP Classes

RETRIEVE-SCU provides standard conformance to the supported Retrieve SOP Classes. Only a single information model, Study Root, is supported.

Retrieval will be performed at the STUDY, SERIES or IMAGE level depending on what level of entity has been selected by the user in the browser.

No CANCEL requests are ever issued.

The retrieval is performed from the AE that was specified in the Retrieve AE attribute returned from the query performed by QUERY-SCU. The instances are retrieved to the local database by specifying the destination as the AE Title of the STORE-SCP AE. This implies that the remote Retrieve SCP must be preconfigured to determine the presentation address corresponding to the STORE-SCP AE. The STORE-SCP AE will accept storage requests addressed to it from anywhere, so no pre-configuration of

the local application to accept from the remote AE is necessary (except in so far as it was necessary to configure QUERY-SCU).

**Table 4.2-46**

**STUDY ROOT REQUEST IDENTIFIER FOR RETRIEVE-SCU**

| Name | Tag | Unique, Matching or Return Key |
|---|---|---|
| STUDY level | | |
| Study Instance UID | (0020,000D) | U, L |
| SERIES level | | |
| Series Instance UID | (0020,000E) | U, L |
| IMAGE level | | |
| SOP Instance UID | (0008,0018) | U, L |

The types of Matching supported by the RETRIEVE-SCU:

A 'U' indicates Universal Matching and an 'L' indicates that UID lists are sent.

RETRIEVE-SCU will behave as described in Table 4.2.5.4.1.3.3-2 in response to the status returned in the C-MOVE response command message(s).

**Table 4.2-47**

**RESPONSE STATUS FOR RETRIEVE-SCU AND RETRIEVE FROM REMOTE AE REQUEST**

| Service Status | Further Meaning | Status Codes | Behavior |
|---|---|---|---|
| Refused | Out of Resources - Unable to calculate number of matches | A701 | Retrieval is terminated |
| | Out of Resources - Unable to perform sub-operations | A702 | Retrieval is terminated |
| | Move Destination unknown | A801 | Retrieval is terminated |
| Failed | Identifier does not match SOP Class | A900 | Retrieval is terminated |
| | Unable to process | Cxxx | Retrieval is terminated |
| Cancel | Sub-operations terminated due to Cancel Indication | FE00 | Retrieval is terminated (should never occur, since cancels never issued) |
| Warning | Sub-operations Complete - One or more Failures | B000 | Retrieval is terminated |

| Success | Sub-operations Complete - No Failures | 0000 | Retrieval is terminated |
|---------|----------------------------------------|------|-------------------------|
| Pending | Sub-operations are continuing | FF00 | Retrieval continues |

Since the C-MOVE operation is dependent on completion of C-STORE sub-operations that are occurring on a separate association, the question of failure of operations on the other association(s) must be considered.

RETRIEVE-SCU completely ignores whatever activities are taking place in relation to the STORAGE-SCP AE that is receiving the retrieved instances. Once the C-MOVE has been initiated it runs to completion (or failure) as described in the C-MOVE response command message(s). There is no attempt by RETRIEVE-SCU to confirm that instances have actually been successfully received or locally stored.

Whether or not completely or partially successfully retrievals are made available in the local database to the user is purely dependent on the success or failure of the C-STORE sub-operations, not on any explicit action by RETRIEVE-SCU.

Whether or not the remote AE attempts to retry any failed C-STORE sub-operations is beyond the control of RETRIEVE-SCU.

If the association on which the C-MOVE was issued is aborted for any reason, whether or not the C-STORE sub-operations continue is dependent on the remote AE; the local STORAGE-SCP will continue to accept associations and storage operations regardless.

### 4.2.5.4 Association Acceptance Policy

RETRIEVE-SCU does not accept associations.

## 4.3 Physical Network Interfaces

### 4.3.1 Supported Communication Stacks

SoliPACS Server DICOM AEs provide DICOM 3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

### 4.3.1.1 TCP/IP Stack

SoliPACS Server DICOM AEs inherit their TCP/IP stack from the Windows 2003 Operating System upon which they execute.

### 4.3.2    PHYSICAL NETWORK SUPPORT Physical Network Interface

The SoliPACS Server 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 |

### 4.3.3    Additional Protocols

SoliPACS Server does not support additional protocols.

## 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 APPLICATION ENTITY CHARACTERISTICS**

| Application Entity | Role | Default AE Title | Default TCP/IP Port |
|---|---|---|---|
| STORAGE-SCU | SCU | | None |
| STORAGE-SCP | SCP | SoliPACS Server | 104 |
| QUERY-RETRIEVE-SCP | SCP | | |

### 4.4.1.2 Remote AE Title/Presentation Address Mapping

The mapping of external AE Titles to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel. This mapping is necessary for resolving the IP address and port of C-MOVE Destination Application Entities and must be correctly configured for the QUERY-RETRIEVE-SCP AE to correctly function as a C-MOVE SCP. The mapping is also necessary for resolving the IP address and port of Storage Commitment SCU Application Entities for STORAGE-SCP to transmit N-EVENT-REPORT-RQ.

### 4.4.2 Default Parameters

**Table 4.4-2**

**DEFAULT PARAMETERS**

| Parameter | Configurable | Default Value |
|---|---|---|
| **General Parameters** | | |
| Maximum PDU size I can receive | Yes | 64kbytes |
| Maximum PDU size I can send | Yes | 64kbytes |
| Time-out waiting for A-ASSOCIATE RQ PDU on open TCP/IP connection. (ARTIM timeout) | No | 5 minutes |
| Time-out waiting for acceptance or rejection response to an Association Open Request. (Application Level timeout) | No | 5 minutes |
| **STORAGE-SCU AE Parameters** | | |
| STORAGE-SCU AE time-out waiting for a Response to a C-STORE-RQ. (DIMSE timeout) | No | 5 minutes |
| STORAGE-SCU AE number of times a failed send job to a C-MOVE Destination is automatically retried. | No | 0 |
| **STORAGE-SCP AE Parameters** | | |
| STORAGE-SCP AE time-out waiting on an open Association for the next Request message (C-STORE-RQ, Association Close Request. etc.) (DIMSE timeout) | No | 5 minutes |
| Always open a new Association to send a Storage Commitment Push Model Notification request (N-EVENT-REPORT-RQ). | No | FALSE (See 4.2.3.4.1.5) |
| Maximum number of times to attempt sending a Storage Commitment Push Model N-EVENT-REPORT Request when an error status is returned or communication failure occurs. | No | 0 |

| QUERY-RETRIEVE-SCP AE Parameters | | |
|---|---|---|
| QUERY-RETRIEVE-SCP AE time-out waiting on an open Association for the next message (C-FIND-RQ, C-MOVE-RQ, Association Close Request. etc.) (DIMSE timeout) | No | 5 minutes |

## 5. Media Storage

SoliPACS Server does not support Media Storage.

## 6. Support for Extended Character Sets

For Japan market only

In addition to DICOM default character set ISO 2022 IR 6, SoliPACS Server supports the following Japanese character sets for all SOP Classes and both SCU and SCP roles:

ISO 2022 IR 13    Japanese katakana (phonetic) characters (94 characters)

ISO 2022 IR 87    Japanese kanji (ideographic), hiragana (phonetic), and katakana (phonetic) characters (942 characters, 2-byte)

## 7. Security

The SoliPACS Server does not support any of the DICOM Security profiles.