Visage® 7

DICOM Conformance Statement

Information about manufacturer and distribution contacts as well as regulatory status of the product can be found in the User Manual.

Some of the specifications described herein may not be currently available in all countries. Please contact your local sales representative for the most current information.

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1. Conformance Statement Overview

The Visage 7 concept is based on a modular architecture for viewing and distributing medical images and reports within and outside of a clinical area. It allows external systems to send images to it for temporary storage, retrieve information about such images, and retrieve the images themselves. It provides prefetch, autorouting, export to CD/DVD and print to networked hardcopy device mechanisms and supports sending images across the network to other systems. Additionally Visage 7 is able to handle worklist and performed procedure step requests received from modalities by accessing a configured RIS database and to forward received GP-PPS and MPPS messages to preconfigured DICOM nodes. Instance Availability Notification messages inform partner applications about completely available studies revceived by the system.

A Media Viewer application is provided together with the data exported to CD/DVD to allow browsing and viewing the media contents independent from an installed Visage 7 system.

Visage 7 consists of a backend server providing temporary storage and archiving functionality (license dependent).

Visage Web Client can be used for image distribution and basic 2D viewing. For advanced reading functionality, the Visage Client is available using state-of-the-art thin client and streaming technologies to provide outstanding performance for different network topologies.

Visage 7 conforms to the DICOM 3.0 standard to allow the sharing of medical information with other digital imaging systems.

The supported SOP Classes are listed in the table below according to the present version of Visage 7 (Visage 7 Online with or without Visage 7 Archive).

SOP Class Name	User of Service (SCU)	Provider of Service (SCP)	Visage 7 Online	+ Visage 7 Archive
Verification				
Verification	Yes	Yes	X	X
Query/Retrieve				
Patient Root Q/R Information Model - FIND	No	Yes	X	X
Patient Root Q/R Information Model - MOVE	No	Yes	X	X
Study Root Q/R Information Model - FIND	Yes	Yes	X	X
Study Root Q/R Information Model - MOVE	Yes	Yes	X	X
Patient Study Only Information Model - FIND	No	Yes	X	X
Patient Study Only Information Model - MOVE	No	Yes	X	X

Mitra Report Management - FIND	Yes	No	X	X
Modality Worklist				
Modality Worklist Information Model - FIND	No	Yes	X	X
Workflow Management				
Modality Performed Procedure Step	Yes	Yes	X	X
General Purpose Performed Procedure Step	Yes	Yes	X	X
Instance Availability Notification	Yes	No	X	X
Storage Commitment				
Storage Commitment Push Model	Yes		X	X
Storage Commitment Push Model		Yes		X
Print				
Basic Grayscale Print Management Meta	Yes	No	X	X
Basic Color Print Management Meta	Yes	No	X	X
Print Job	Yes	No	X	X
Image Transfer				
Stored Print Storage	Yes	Yes	X	X
Hardcopy Grayscale Image Storage	Yes	Yes	X	X
Hardcopy Color Image Storage	Yes	Yes	X	X
Computed Radiography Image Storage	Yes	Yes	X	X
Digital X-Ray Image Storage - For Presentation	Yes	Yes	X	X
Digital X-Ray Image Storage - For Processing	Yes	Yes	X	X
Digital Mammography X-Ray Image Storage - For Presentation	Yes	Yes	X	X
Digital Mammography X-Ray Image Storage - For Processing	Yes	Yes	X	X
Digital Intra-oral X-Ray Image Storage - For Presentation	Yes	Yes	X	X
Digital Intra-oral X-Ray Image Storage - For Processing	Yes	Yes	X	X
CT Image Storage	Yes	Yes	X	X
Enhanced CT Image Storage	Yes	Yes	X	X
Ultrasound Multi-Frame Image Storage (Retired)	Yes	Yes	X	X
Ultrasound Multi-Frame Image Storage	Yes	Yes	X	X
MR Image Storage	Yes	Yes	X	X
Enhanced MR Image Storage	Yes	Yes	X	X
MR Spectroscopy Storage	Yes	Yes	X	X
Nuclear Medicine Image Storage (Retired)	Yes	Yes	X	X
Ultrasound Image Storage (Retired)	Yes	Yes	X	X
Ultrasound Image Storage	Yes	Yes	X	X
Secondary Capture Image Storage	Yes	Yes	X	X
Multi-frame Single Bit Secondary Capture Image Storage	Yes	Yes	X	X
Multi-frame Grayscale Byte Secondary Capture Image Storage	Yes	Yes	X	X
Multi-frame Grayscale Word Secondary Capture Image Storage	Yes	Yes	X	X
Mulfi-frame True Color Secondary Capture Image Storage	Yes	Yes	X	X
Standalone Overlay Storage	Yes	Yes	X	X
Standalone Curve Storage	Yes	Yes	X	X
12-lead ECG Waveform Storage	Yes	Yes	X	X

General ECG Waveform Storage	Yes	Yes	X	X
Ambulatory ECG Waveform Storage	Yes	Yes	X	X
Hemodynamic Waveform Storage	Yes	Yes	X	X
Cardiac Electrophysiology Waveform Storage	Yes	Yes	X	X
Basic Voice Audio Waveform Storage	Yes	Yes	X	X
Standalone Modality LUT Storage	Yes	Yes	X	X
Standalone VOI LUT Storage	Yes	Yes	X	X
Grayscale Softcopy Presentation State Storage	Yes	Yes	X	X
Color Softcopy Presentation State Storage	Yes	Yes	X	X
Pseudo-Color Softcopy Presentation State Storage	Yes	Yes	X	X
Blending Softcopy Presentation State Storage	Yes	Yes	X	X
X-Ray Angiographic Image Storage	Yes	Yes	X	X
Enhanced XA Image Storage	Yes	Yes	X	X
X-Ray Radiofluoroscopic Image Storage	Yes	Yes	X	X
Enhanced XRF Image Storage	Yes	Yes	X	X
X-Ray Angiographic Bi-Plane Image Storage	Yes	Yes	X	X
X-Ray 3D Craniofacial Image Storage	Yes	Yes	X	X
Nuclear Medicine Image Storage	Yes	Yes	X	X
Raw Data Storage	Yes	Yes	X	X
Spatial Registration Storage	Yes	Yes	X	X
Spatial Fiducials Storage	Yes	Yes	X	X
Deformable Spatial Registration Storage	Yes	Yes	X	X
Segmentation Storage	Yes	Yes	X	X
Real World Value Mapping Storage	Yes	Yes	X	X
VL Endoscopic Image Storage	Yes	Yes	X	X
Video Endoscopic Image Storage	Yes	Yes	X	X
VL Microscopic Image Storage	Yes	Yes	X	X
Video Microscopic Image Storage	Yes	Yes	X	X
VL Slide-Coordinates Microscopic Image Storage	Yes	Yes	X	X
VL Photographic Image Storage	Yes	Yes	X	X
Video Photographic Image Storage	Yes	Yes	X	X
Ophthalmic 8 Bit Photography Image Storage	Yes	Yes	X	X
Ophthalmic Photography 16 Bit Image Storage	Yes	Yes	X	X
Stereometric Relationship Storage	Yes	Yes	X	X
Basic Text Structured Reporting	Yes	Yes	X	X
Enhanced Structured Reporting	Yes	Yes	X	X
Comprehensive Structured Reporting	Yes	Yes	X	X
Procedure Log	Yes	Yes	X	X
Mammography CAD SR	Yes	Yes	X	X
Key Object Selection	Yes	Yes	X	X
Chest CAD SR	Yes	Yes	X	X
X-Ray Radiation Dose SR	Yes	Yes	X	X
Encapsulated PDF Storage	Yes	Yes	X	X

Positron Emission Tomography Image Storage	Yes	Yes	X	X
Standalone PET Curve Storage	Yes	Yes	X	X
RT Image Storage	Yes	Yes	X	X
RT Dose Storage	Yes	Yes	X	X
RT Structure Set Storage	Yes	Yes	X	X
RT Beams Treatment Record Storage	Yes	Yes	X	X
RT Plan Storage	Yes	Yes	X	X
Radiotherapy Brachy Treatment Record Storage	Yes	Yes	X	X
Radiotherapy Summary Treatment Record Storage	Yes	Yes	X	X
RT Ion Plan Storage	Yes	Yes	X	X
RT Ion Beams Treatment Record Storage	Yes	Yes	X	X
CSA Non-Image Storage	Yes	Yes	X	X
Breast Tomosynthesis Image Storage	Yes	Yes	X	X

Table 1: SUPPORTED NETWORKING DICOM SERVICE (SOP) CLASSES

In the follwing table an overview of the Media Storage Application Profiles supported by Visage 7 is provided.

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
General Purpose CD-R	Yes	Yes

Table 2: SUPPORTED MEDIA SERVICES

2. Table of Contents

1. CONFORMANCE STATEMENT OVERVIEW 3

2. TABLE OF CONTENTS 7

3. INTRODUCTION 12

3.1 REVISION HISTORY 12
3.2 AUDIENCE 12
3.3 REMARKS 12
3.4 ABBREVIATIONS AND ACRONYMS 13

4. NETWORKING 14

4.1 IMPLEMENTATION MODEL 14
4.1.1 APPLICATION DATA FLOW 14
4.1.2 FUNCTIONAL DEFINITION OF AES 18
4.1.2.1 Functional Definition of STORAGE-SCU Application Entity 18
4.1.2.2 Functional Definition of Storage Commitment-SCU Application Entity 18
4.1.2.3 Functional Definition of STORAGE-SCP Application Entity 18
4.1.2.4 Functional Definition of QUERY-SCU Application Entity 18
4.1.2.5 Functional Definition of RETRIEVE-SCU Application Entity 18
4.1.2.6 Functional Definition of QUERY-RETRIEVE-SCP Application Entity (Level A) 18
4.1.2.7 Functional Definition of QUERY-RETRIEVE-SCP Application Entity (Level B) 19
4.1.2.8 Functional Definition of QUERY-RETRIEVE-SCP Application Entity (Archive Level) 19
4.1.2.9 Functional Definition of Modality-Worklist-SCP Application Entity 19
4.1.2.10 Functional Definition of PPS-SCP Application Entity 19
4.1.2.11 Functional Definition of PPS-SCU Application Entity 19
4.1.2.12 Functional Definition of INSTANCE AVAILABILITY NOTIFICATION-SCU AE 20
4.1.2.13 Functional Definition of REPORT-SCU Application Entity 20
4.1.2.14 Functional Definition of PRINT-SCU Application Entity 20
4.1.3 SEQUENCING OF REAL-WORLD ACTIVITIES 21
4.2 AE SPECIFICATIONS 22
4.2.1 STORAGE-SCU APPLICATION ENTITY SPECIFICATION 22
4.2.1.1 SOP Classes 22
4.2.1.2 Association Establishment Policies 24
4.2.1.2.1 General 24
4.2.1.2.2 Number of Associations 24
4.2.1.2.3 Asynchronous Nature 24
4.2.1.2.4 Implementation Identifying Information 25
4.2.1.3 Association Initiation Policy 25
4.2.1.3.1 Activity – Send Images Requested by an External Peer AE 25
4.2.1.3.1.1 Description and Sequencing of Activity 25
4.2.1.3.1.2 Proposed Presentation Contexts 27
4.2.1.3.1.3 SOP Specific Conformance for Verification SOP Class 30
4.2.1.3.1.4 SOP Specific Conformance for Storage SOP Classes 30
4.2.1.4 Association Acceptance Policy 32
4.2.2 STORAGE COMMITMENT-SCU APPLICATION ENTITY SPECIFICATION 33
4.2.2.1 SOP Classes 33
4.2.2.2 Association Establishment Policies 33
4.2.2.2.1 General 33
4.2.2.2.2 Number of Associations 33
4.2.2.2.3 Asynchronous Nature 34
4.2.2.2.4 Implementation Identifying Information 34

4.2.2.3 Association Initiation Policy 34
4.2.2.3.1 Activity – Request Commitment for Sent Images 34
4.2.2.3.1.1 Description and Sequencing of Activity 34
4.2.2.3.1.2 Proposed Presentation Contexts 35
4.2.2.3.1.3 SOP Specific Conformance for Storage Commitment Push Model SOP Class 35
4.2.2.4 Association Acceptance Policy 36
4.2.2.4.1 Activity – Handling Storage Commitment Responses 36
4.2.2.4.1.1 Description and Sequencing of Activity 36
4.2.2.4.1.2 Accepted Presentation Contexts 37
4.2.2.4.1.3 SOP Specific Conformance for Storage Commitment Push Model SOP Class 37
4.2.3 STORAGE-SCP APPLICATION ENTITY SPECIFICATION 38
4.2.3.1 SOP Classes 38
4.2.3.2 Association Establishment Policies 41
4.2.3.2.1 General 41
4.2.3.2.2 Number of Associations 41
4.2.3.2.3 Asynchronous Nature 41
4.2.3.2.4 Implementation Identifying Information 42
4.2.3.3 Association Initiation Policy 43
4.2.3.3.1 Activity – Send Storage Commitment Notification 43
4.2.3.3.1.1 Description and Sequencing of Activity 43
4.2.3.3.1.2 Proposed Presentation Contexts 44
4.2.3.3.1.3 SOP Specific Conformance for Storage Commitment Push Model SOP Class 44
4.2.3.4 Association Acceptance Policy 45
4.2.3.4.1 Activity – Handling Storage and Storage Commitment Requests 45
4.2.3.4.1.1 Description and Sequencing of Activity 45
4.2.3.4.1.2 Accepted Presentation Contexts 47
4.2.3.4.1.3 SOP Specific Conformance for Verification SOP Class 50
4.2.3.4.1.4 SOP Specific Conformance for Storage SOP Classes 50
4.2.3.4.1.5 SOP Specific Conformance for Storage Commitment Push Model SOP Class 53
4.2.4 QUERY-SCU APPLICATION ENTITY SPECIFICATION 55
4.2.4.1 SOP Classes 55
4.2.4.2 Association Establishment Policies 55
4.2.4.2.1 General 55
4.2.4.2.2 Number of Associations 55
4.2.4.2.3 Asynchronous Nature 55
4.2.4.2.4 Implementation Identifying Information 56
4.2.4.3 Association Initiation Policy 56
4.2.4.3.1 Activity – Send Query Requests to an External Peer AE 56
4.2.4.3.1.1 Description and Sequencing of Activity 56
4.2.4.3.1.2 Proposed Presentation Contexts 57
4.2.4.3.1.3 SOP Specific Conformance for Verification SOP Class 57
4.2.4.3.1.4 SOP Specific Conformance for Query SOP Classes 57
4.2.4.4 Association Acceptance Policy 58
4.2.5 RETRIEVE-SCU APPLICATION ENTITY SPECIFICATION 59
4.2.5.1 SOP Classes 59
4.2.5.2 Association Establishment Policies 59
4.2.5.2.1 General 59
4.2.5.2.2 Number of Associations 59
4.2.5.2.3 Asynchronous Nature 59
4.2.5.2.4 Implementation Identifying Information 60
4.2.5.3 Association Initiation Policy 60
4.2.5.3.1 Activity – Send Retrieve Requests to an External Peer AE 60
4.2.5.3.1.1 Description and Sequencing of Activity 60
4.2.5.3.1.2 Proposed Presentation Contexts 62
4.2.5.3.1.3 SOP Specific Conformance for Verification SOP Class 62
4.2.5.3.1.4 SOP Specific Conformance for Retrieve SOP Classes 62

4.2.5.4 Association Acceptance Policy 62
4.2.6 QUERY-RETRIEVE-SCP APPLICATION ENTITY (LEVEL A) SPECIFICATION 63
4.2.6.1 SOP Classes 63
4.2.6.2 Association Establishment Policies 63
4.2.6.2.1 General 63
4.2.6.2.2 Number of Associations 63
4.2.6.2.3 Asynchronous Nature 64
4.2.6.2.4 Implementation Identifying Information 64
4.2.6.3 Association Initiation Policy 64
4.2.6.4 Association Acceptance Policy 64
4.2.6.4.1 Activity – Handling Query and Retrieval Requests 64
4.2.6.4.1.1 Description and Sequencing of Activity 64
4.2.6.4.1.2 Accepted Presentation Contexts 67
4.2.6.4.1.3 SOP Specific Conformance for Verification SOP Class 67
4.2.6.4.1.4 SOP Specific Conformance for Query SOP Classes 67
4.2.6.4.1.5 SOP Specific Conformance for Retrieval SOP Classes 72
4.2.7 QUERY-RETRIEVE-SCP APPLICATION ENTITY (LEVEL B) SPECIFICATION 74
4.2.8 QUERY-RETRIEVE-SCP APPLICATION ENTITY (ARCHIVE LEVEL) SPECIFICATION 74
4.2.9 MODALITY-WORKLIST-SCP APPLICATION ENTITY SPECIFICATION 75
4.2.9.1 SOP Classes 75
4.2.9.2 Association Establishment Policies 75
4.2.9.2.1 General 75
4.2.9.2.2 Number of Associations 75
4.2.9.2.3 Asynchronous Nature 76
4.2.9.2.4 Implementation Identifying Information 76
4.2.9.3 Association Initiation Policy 76
4.2.9.4 Association Acceptance Policy 76
4.2.9.4.1 Activity – Handling Query Requests 76
4.2.9.4.1.1 Description and Sequencing of Activity 76
4.2.9.4.1.2 Accepted Presentation Contexts 78
4.2.9.4.1.3 SOP Specific Conformance for Verification SOP Class 78
4.2.9.4.1.4 SOP Specific Conformance for Modality Worklist SOP Class 79
4.2.10 PPS-SCP APPLICATION ENTITY SPECIFICATION 81
4.2.10.1 SOP Classes 81
4.2.10.2 Association Establishment Policies 81
4.2.10.2.1 General 81
4.2.10.2.2 Number of Associations 81
4.2.10.2.3 Asynchronous Nature 81
4.2.10.2.4 Implementation Identifying Information 82
4.2.10.3 Association Initiation Policy 82
4.2.10.4 Association Acceptance Policy 82
4.2.10.4.1 Activity – Handling PPS Requests 82
4.2.10.4.1.1 Description and Sequencing of Activity 82
4.2.10.4.1.2 Accepted Presentation Contexts 84
4.2.10.4.1.3 SOP Specific Conformance for Verification SOP Class 85
4.2.10.4.1.4 SOP Specific Conformance for MPPS SOP Class 85
4.2.10.4.1.5 SOP Specific Conformance for GP-PPS SOP Class 86
4.2.11 PPS-SCU APPLICATION ENTITY SPECIFICATION 88
4.2.11.1 SOP Classes 88
4.2.11.2 Association Establishment Policies 88
4.2.11.2.1 General 88
4.2.11.2.2 Number of Associations 88
4.2.11.2.3 Asynchronous Nature 88
4.2.11.2.4 Implementation Identifying Information 89
4.2.11.3 Association Initiation Policy 89
4.2.11.3.1 Activity – Send PPS Requests to an External Peer AE 89

4.2.11.3.1.1 Description and Sequencing of Activity 89
4.2.11.3.1.2 Proposed Presentation Contexts 91
4.2.11.3.1.3 SOP Specific Conformance for Verification SOP Class 91
4.2.11.3.1.4 SOP Specific Conformance for MPPS SOP Class 91
4.2.11.3.1.5 SOP Specific Conformance for GP-PPS SOP Class 91
4.2.11.4 Association Acceptance Policy 91
4.2.12 INSTANCE AVAILABILITY NOTIFICATION-SCU APPLICATION ENTITY SPECIFICATION 92
4.2.12.1 SOP Classes 92
4.2.12.2 Association Establishment Policies 92
4.2.12.2.1 General 92
4.2.12.2.2 Number of Associations 92
4.2.12.2.3 Asynchronous Nature 92
4.2.12.2.4 Implementation Identifying Information 93
4.2.12.3 Association Initiation Policy 93
4.2.12.3.1 Activity – Send Instance Availability Notification Requests to an External Peer AE 93
4.2.12.3.1.1 Description and Sequencing of Activity 93
4.2.12.3.1.2 Proposed Presentation Contexts 95
4.2.12.3.1.3 SOP Specific Conformance for Verification SOP Class 95
4.2.12.3.1.4 SOP Specific Conformance for Instance Availability Notification SOP Class 95
4.2.12.4 Association Acceptance Policy 95
4.2.13 REPORT-SCU APPLICATION ENTITY SPECIFICATION 96
4.2.13.1 SOP Classes 96
4.2.13.2 Association Establishment Policies 96
4.2.13.2.1 General 96
4.2.13.2.2 Number of Associations 96
4.2.13.2.3 Asynchronous Nature 96
4.2.13.2.4 Implementation Identifying Information 97
4.2.13.3 Association Initiation Policy 97
4.2.13.3.1 Activity – Send Report Requests to an External Peer AE 97
4.2.13.3.1.1 Description and Sequencing of Activity 97
4.2.13.3.1.2 Proposed Presentation Contexts 99
4.2.13.3.1.3 SOP Specific Conformance for Verification SOP Class 100
4.2.13.3.1.4 SOP Specific Conformance for Report SOP Classes 100
4.2.13.4 Association Acceptance Policy 100
4.2.14 PRINT-SCU APPLICATION ENTITY SPECIFICATION 101
4.2.14.1 SOP Classes 101
4.2.14.2 Association Establishment Policies 101
4.2.14.2.1 General 101
4.2.14.2.2 Number of Associations 101
4.2.14.2.3 Asynchronous Nature 101
4.2.14.2.4 Implementation Identifying Information 102
4.2.14.3 Association Initiation Policy 102
4.2.14.3.1 Activity – Send Print Requests to an External Peer AE 102
4.2.14.3.1.1 Description and Sequencing of Activity 102
4.2.14.3.1.2 Proposed Presentation Contexts 105
4.2.14.3.1.3 SOP Specific Conformance for Verification SOP Class 105
4.2.14.3.1.4 SOP Specific Conformance for Basic Grayscale Print Management Meta SOP Class 106
4.2.14.3.1.5 SOP Specific Conformance for Basic Color Print Management Meta SOP Class 110
4.2.14.3.1.6 SOP Specific Conformance for Print Job SOP Class 112
4.2.14.4 Association Acceptance Policy 112
4.3 PHYSICAL NETWORK INTERFACES 113
4.3.1 SUPPORTED COMMUNICATION STACKS 113
4.3.1.1 TCP/IP Stack 113
4.3.2 PHYSICAL NETWORK INTERFACE 113
4.3.3 ADDITIONAL PROTOCOLS 113
4.4 CONFIGURATION 114

4.4.1 AE TITLE/PRESENTATION ADDRESS MAPPING 114
4.4.1.1 Local AE Titles 114
4.4.1.2 Remote AE Title/Presentation Address Mapping 114
4.4.2 PARAMETERS 115

5. MEDIA STORAGE 119

5.1 IMPLEMENTATION MODEL 119
5.1.1 APPLICATION DATA FLOW 119
5.1.2 FUNCTIONAL DEFINITION OF AES 119
5.1.2.1 Functional Definition of Offline-Media Application Entity 119
5.1.2.2 Functional Definition of Media Viewer Application Entity 119
5.1.3 SEQUENCING OF REAL-WORLD ACTIVITIES 120
5.1.4 FILE META INFORMATION OPTIONS 120
5.2 AE SPECIFICATIONS 120
5.2.1 OFFLINE-MEDIA APPLICATION ENTITY SPECIFICATION 120
5.2.1.1 File Meta Information for the Application Entity 120
5.2.1.2 Real-World Activities 120
5.2.1.2.1 Activity – Patient Export 121
5.2.1.2.1.1 Media Storage Application Profiles 121
5.2.1.2.1.2 Options 121
5.2.2 MEDIA VIEWER APPLICATION ENTITY SPECIFICATION 121
5.2.2.1 File Meta Information for the Application Entity 121
5.2.2.2 Real-World Activities 121
5.2.2.2.1 Activity – Load DICOMDIR, Directory or File 121
5.2.2.2.1.1 Media Storage Application Profiles 122
5.2.2.2.1.2 Options 122
5.3 AUGMENTED AND PRIVATE APPLICATION PROFILES 122
5.4 CONFIGURATION 122

6. SUPPORT OF EXTENDED CHARACTER SETS 123

7. SECURITY 124

7.1 SECURITY PROFILES 124
7.2 ASSOCIATION LEVEL SECURITY 124

8. ANNEXES 125

8.1 IOD CONTENTS OF CREATED SOP INSTANCES 125
8.1.1 SNAPSHOT IMAGE IOD 125
8.1.2 THICK SLICE IMAGE IOD 129
8.1.3 REFORMATTED MPR IMAGE IOD 132
8.2 SUPPORTED STRUCTURED REPORT ATTRIBUTES 135

3. Introduction

3.1 Revision History

Document Version	Date	Description
01.00	10-Dec-2009	Release for Visage 7
01.01	27-Jan-2012	Support of Storage Commitment Push SCU
02.00	16-May-2012	Approved (Visage 7.1.0)
02.01	19-Jul-2012	Added support for Breast Tomosynthesis Image Storage
03.00	20-Jul-2012	Approved (Visage 7.1.2)

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

This document is the DICOM Conformance Statement for Visage 7. The document is formatted according to DICOM Supplement 64.

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 Visage 7 and other DICOM systems. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. 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 Visage 7 and other DICOM conformant equipment.
- Test procedures should be defined to validate the desired level of connectivity.

3.4 Abbreviations and Acronyms

AE	Application Entity
AET	Application Entity Title
CD	Compact Disk
CS	Client/Server
DICOM	Digital Imaging and Communications in Medicine
DVD	Digital Versatile Disc
FSC	File-Set Creator
FSR	File-Set Reader
FSU	File-Set Updater
GP-PPS	General Purpose Performed Procedure Step
IOD	Information Object Definition
IP	Internet Protocol
JPEG	Joint Pictures Expert Group
MPPS	Modality Performed Procedure Step
MWL	Modality Worklist
PACS	Picture Archiving and Communication System
PIR	Patient Information Reconciliation
PPS	Performed Procedure Step
RIS	Radiology Information System
SC	Service Class
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
SP	Service Pack
TCP	Transmission Control Protocol
UID	Unique Identifier
VR	Value Representation

4. Networking

4.1 Implementation Model

4.1.1 Application Data Flow

Application Entity Title Specification

By default all of the defined Application Entities have different AE Titles.

- AETs of QUERY-RETRIEVE-SCP (Level A), QUERY-RETRIEVE-SCP (Level B) and QUERY-RETRIEVE-SCP (Archive Level) must differ.

- AET of STORAGE-SCP can be the same as the AET of QUERY-RETRIEVE-SCP (Level A), QUERY-RETRIEVE-SCP (Level B) or QUERY-RETRIEVE-SCP (Archive Level).

- AETs of QUERY-SCU, RETRIEVE-SCU and REPORT-SCU can be set to any value.

- AET of STORAGE-SCU can be set to any value. If the STORAGE-SCU is used to transfer DICOM objects after a move request and the destination AET is the same as the calling AET the AET of the QUERY-RETRIEVE-SCP (Level A, Level B or Archive Level) is used as STORAGE-SCU AET.

- AETs of QUERY-RETRIEVE-SCP (Level A), QUERY-RETRIEVE-SCP (Level B) and QUERY-RETRIEVE-SCP (Archive Level) must be called for handling Verification, Query, Retrieve, Modality and Worklist Query.

- AET of STORAGE-SCP must be called for handling Verification, Storage, Storage Commitment and PPS Requests.

Application Entity Description

- The STORAGE-SCU AE can send Composite SOP Instances. On the one hand it is used to handle requests from a Local User to send Images to selected Remote AEs. On the other hand the QUERY-RETRIEVE-SCP AE transmits via STORAGE-SCU AE Instances to a specific DICOM destination. Additionally the STORAGE-SCP AE autoroutes DICOM objects to configured partner STORAGE SCP AEs by using the STORAGE-SCU AE. The STORAGE-SCU AE functions as a C-STORE SCU.
- The Storage Commitment-SCU AE, part of the STORAGE-SCU AT, can request Storage Commitment Push Model requests on one Remote AE and store the obtained commitment in the local database.

- The STORAGE-SCP AE can receive incoming DICOM images and add them to the Visage 7 database. It can respond to external Storage and Verification Requests as a Service Class Provider (SCP) for solicited C-STORE and C-ECHO requests. The STORAGE-SCP AE can also handle Storage Commitment Push Model Requests. It can thus be used to query whether Visage 7 will confirm ownership and responsibility for specific Composite SOP Instances. Additionally the STORAGE-SCP AE initiates prefetch requests to load previous studies of a patient from Visage 7 Archive or partner AEs to Visage 7 Online automatically. For this purpose the AEs QUERY-SCU and RETRIEVE-SCU are used to perform the required query/retrieve requests.

- The QUERY-SCU AE can query remote AEs for lists of studies. The QUERY-SCU AE functions as a C-FIND SCU.

- The RETRIEVE-SCU AE can direct remote AEs to transfer selected studies to Visage 7. The RETRIEVE-SCU AE functions as a C-MOVE SCU.

- The QUERY-RETRIEVE-SCP AE (Level A) can handle incoming query and retrieve requests regarding to SOP Instances stored in Compression Level A. It can handle external queries for Patient, Study, Series, and Image data, and also handle Image retrieval requests. The QUERY-RETRIEVE-SCP AE (Level A) 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 (Level A) functions as a SCP for C-FIND, C-MOVE and N-SET requests.

- The QUERY-RETRIEVE-SCP AE (Level B) can handle incoming query and retrieve requests regarding to SOP Instances stored in Compression Level B. It can handle external queries for Patient, Study, Series, and Image data, and also handle Image retrieval requests. The QUERY-RETRIEVE-SCP AE (Level B) 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 (Level B) functions as a SCP for C-FIND, C-MOVE and N-SET requests.

- The QUERY-RETRIEVE-SCP AE (Archive Level) can handle incoming query and retrieve requests regarding to SOP Instances stored in Archive Level. It can handle external queries for Patient, Study, Series, and Image data, and also handle Image retrieval requests. The QUERY-RETRIEVE-SCP AE (Archive Level) 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 (Archive Level) functions as a SCP for C-FIND, C-MOVE and N-SET requests.

- The MODALIY-WORKLIST-SCP AE can handle incoming modality worklist query requests by accessing a RIS database and sending a set of matching responses back to the calling partner MODALITY-WORKLIST-SCU AE. The MODALITY-WORKLIST-SCP AE functions as a SCP for C-FIND requests.

- The PPS-SCP AE can receive incoming GP-PPS/MPPS requests and add the contained information to a RIS database. It can also initiate the forwarding of received GP-PPS/MPPS messages to configured partner PPS SCP AEs by issuing a command to the PPS-SCU AE. The PPS-SCP AE functions as a SCP for N-CREATE and N-SET requests.

- The PPS-SCU AE can send GP-PPS/MPPS Messages which are previously received by the PPS-SCP AE to configured partner PPS SCP AEs. The PPS-SCU AE functions as a SCU for N-CREATE and N-SET requests.

- The INSTANCE AVAILABILITY NOTIFICATION-SCU AE can send Instance Availability Notification Messages to configured partner INSTANCE AVAILABILITY NOTIFICATION-SCP AEs to inform them of the availability status of newly stored DICOM objects. The INSTANCE AVAILABILITY NOTIFICATION-SCU AE functions as a SCU for N-CREATE requests.

- The REPORT-SCU AE can query for reports on a Mitra Broker and merge it to an already stored Study in the Visage 7 database. The REPORT-SCU AE functions as a SCU for Mitra specific C-FIND requests.

- The PRINT-SCU AE can send print requests for images selected by the user to configured partners PRINT SCP AEs and handles received status information to report the current print job status to the user. The PRINT-SCP AE functions as a SCU for sending N-GET, N-CREATE, N-SET, N-ACTION and N-DELETE requests and receiving N-EVENT-REPORT requests.

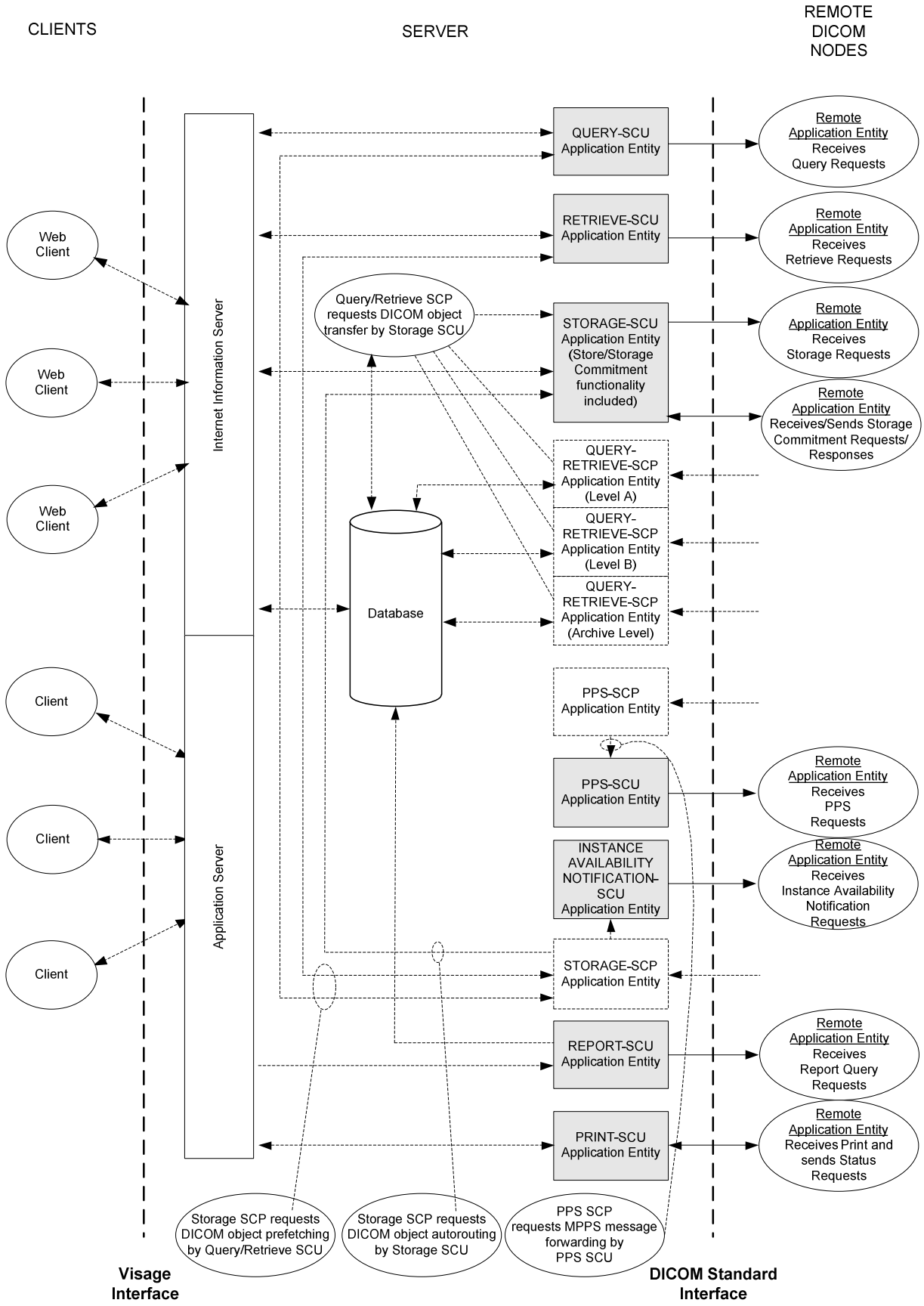

Figure 1: Visage 7 SCU AE DICOM DATA FLOW DIAGRAM

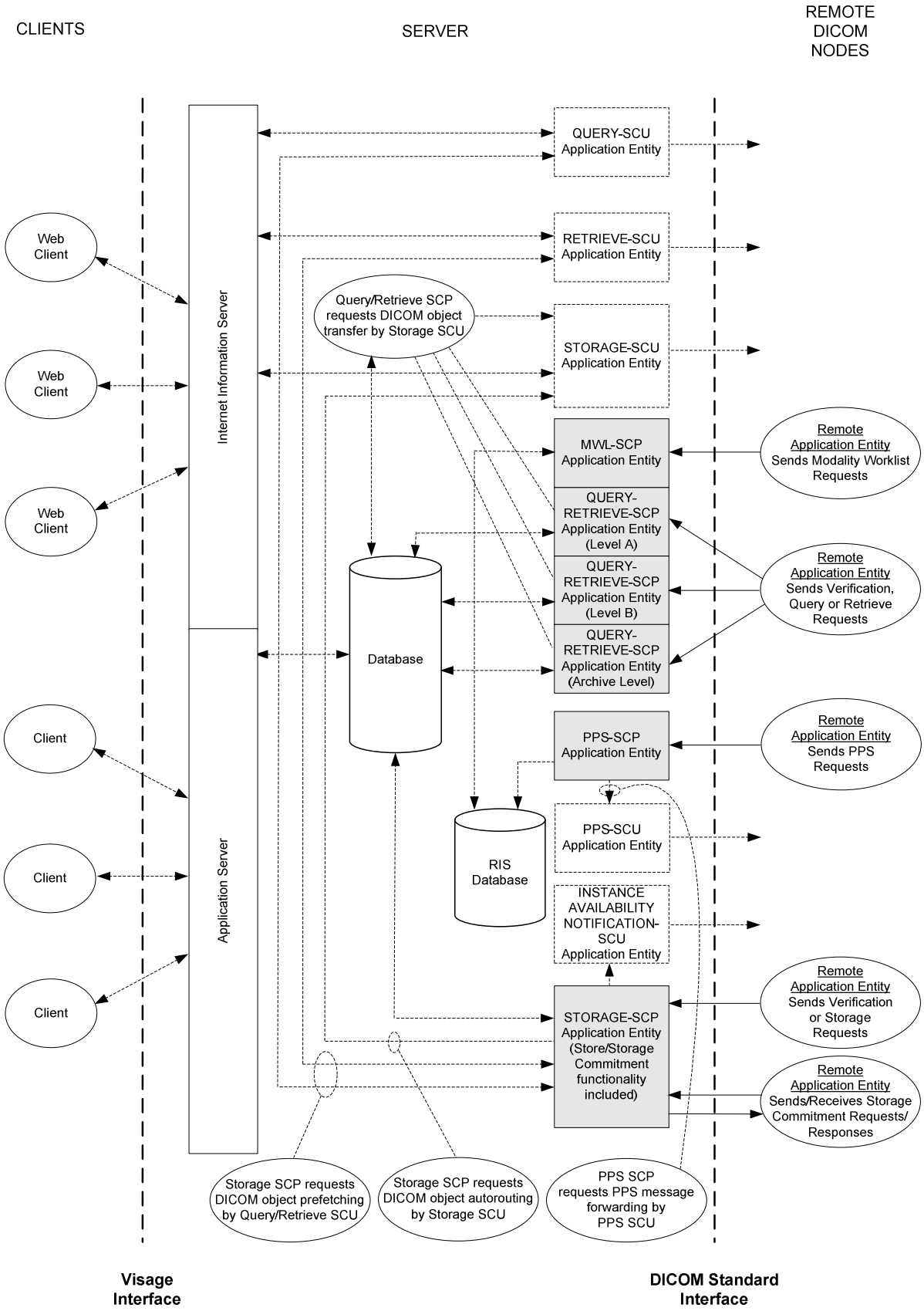

Figure 2: Visage 7 SCP AE DICOM DATA FLOW DIAGRAM

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 (Move Request) or the STORAGE-SCP AE (Autorouting Request) to trigger the transfer of specific images to a remote destination AE. Additionally the STORAGE-SCU AE can be activated through the user interface when a user selects patients, studies, series or instances and requests that they be sent to a remote AE (selected from a preconfigured list). The STORAGE-SCU AE must be correctly configured with the host and port number of any external DICOM AE's that are to be C-STORE send, C-MOVE retrieval or autoroute destinations. The Presentation Contexts to use are determined from the headers of the DICOM files to be transferred. The conversion of the DICOM image objects to Transfer Syntax 'Implicit VR Little Endian' is possible if the original compressed Transfer Syntax is not supported by the remote destination AE or if decompression is preferred.

4.1.2.2 Functional Definition of Storage Commitment-SCU Application Entity

When images have been sent to a remote AE, the Storage Commitment-SCU can send Storage Commitment Push Model N-Action Request to the remote AE, requesting the commitment of the remote AE for the sent SOP Instances. The remote AE is expected to respond with a N-EVENT-REPORT notification. The commitment result is stored in the local database.

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 Visage 7 database. If a Storage Commitment Push Model N-ACTION Request is received (only possible if Visage 7 Archive module is present) then the STORAGE-SCP AE will 'cache' the Storage Commitment Push Model Requests until all the specified SOP Instances are migrated to Visage 7 Archive. A configurable maximum response time makes an earlier Storage Commitment check possible. After the Storage Commitment check is performed Visage 7 returns a N-EVENT-REPORT Notification. When a new study is received in Visage 7 Online a prefetch process is initiated to bring previous studies of the patient online.

4.1.2.4 Functional Definition of QUERY-SCU Application Entity

The QUERY-SCU AE is activated through the user interface when a user selects a remote AE to query (from a preconfigured list) or the STORAGE-SCP AE initiates a prefetch request with a partner AE configured as prefetch source. Queries are performed on the study level of the Study Root Information Model. The QUERY-SCU AE must be correctly configured with the host and port number of any external DICOM AE's that are to be QUERY-SCP.

4.1.2.5 Functional Definition of RETRIEVE-SCU Application Entity

The RETRIEVE-SCU AE is activated through the user interface when a user selects a study of a previously performed query result data set or the STORAGE-SCP AE initiates a prefetch request with a partner AE configured as prefetch source. Retrieves are performed on the study level of the Study Root Information Model. The RETRIEVE-SCU AE must be correctly configured with the host and port number of any external DICOM AE's that are to be RETRIEVE-SCP. The requested SOP Instances are always transferred to Visage 7.

4.1.2.6 Functional Definition of QUERY-RETRIEVE-SCP Application Entity (Level A)

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 Compression Level A of the Visage 7 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.

4.1.2.7 Functional Definition of QUERY-RETRIEVE-SCP Application Entity (Level B)

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 Compression Level B of the Visage 7 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.

4.1.2.8 Functional Definition of QUERY-RETRIEVE-SCP Application Entity (Archive Level)

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 Archive Level of the Visage 7 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.

4.1.2.9 Functional Definition of Modality-Worklist-SCP Application Entity

The MODALITY-WORKLIST-SCP AE waits for another application to connect at the presentation address configured for its Application Entity Title. When another application connects, MODALITY-WORKLIST-SCP AE expects it to be a DICOM application. MODALITY-WORKLIST-SCP AE will accept Associations with Presentation Contexts for SOP Classes of the DICOM Modality Worklist Query Service Class and Verification Service Class. When a MWL query request is received it will query the RIS database for a list of Scheduled Procedure Steps matching the query and will return a pending C-FIND response for each match.

4.1.2.10 Functional Definition of PPS-SCP Application Entity

The PPS-SCP AE waits for another application to connect at the presentation address configured for its Application Entity Title. When another application connects, the PPS-SCP AE expects it to be a DICOM application. The PPS-SCP AE will accept Associations with Presentation Contexts for SOP Classes of the DICOM Modality Performed Procedure Step Service Class, General Purpose Performed Procedure Step Service Class and Verification Service Class. Reception of a MPPS N-CREATE or N-SET Request may result in updates to various tables in the RIS database and may result in changes to the tracking status of the Requested Procedure(s) referenced within the message.

4.1.2.11 Functional Definition of PPS-SCU Application Entity

The PPS-SCU AE can be invoked by the PPS-SCP AE to trigger the transfer of specific GP-PPS/MPPS messages to a remote destination AE. The PPS-SCU AE must be correctly configured with the host and port number of any external DICOM AE’s that are GP-PPS/MPPS N-CREATE or N-SET destinations.

4.1.2.12 Functional Definition of INSTANCE AVAILABILITY NOTIFICATION-SCU AE

The INSTANCE AVAILABILITY NOTIFICATION-SCU AE can be invoked by the STORAGE-SCP AE to inform remote destination AE's of the successful reception of all images associated with a new study. The INSTANCE AVAILABILITY NOTIFICATION-SCU AE must be correctly configured with the host and port number of any external DICOM AE's that are Instance Availability Notification message recipients.

4.1.2.13 Functional Definition of REPORT-SCU Application Entity

The REPORT-SCU AE is activated either manually by the user or automatically when a new study is created in the database. Special Mitra queries are performed to get report information belonging to previously received studies. The REPORT-SCU AE must be correctly configured with the host and port number of any external DICOM AE's that are to be a Mitra Broker.

4.1.2.14 Functional Definition of PRINT-SCU Application Entity

The PRINT-SCU AE is activated through the user interface when a user selects a set of images and initiates a new print job with the PRINT-SCP AE (selected from a preconfigured list). Both the status of the printer and the status of the initiated print jobs are monitored and reported to the user. The PRINT-SCU AE must be configured correctly with the host and port number of any external DICOM AE's that are to be PRINT-SCP.

4.1.3 Sequencing of Real-World Activities

The only sequencing constraint that exists across all the Visage 7 Application Entities is the fact that a Composite SOP Instance must be received by the STORAGE-SCP AE before Storage Commitment Push Model, Query-Retrieve or Report Requests related to this SOP Instance can be successfully handled:

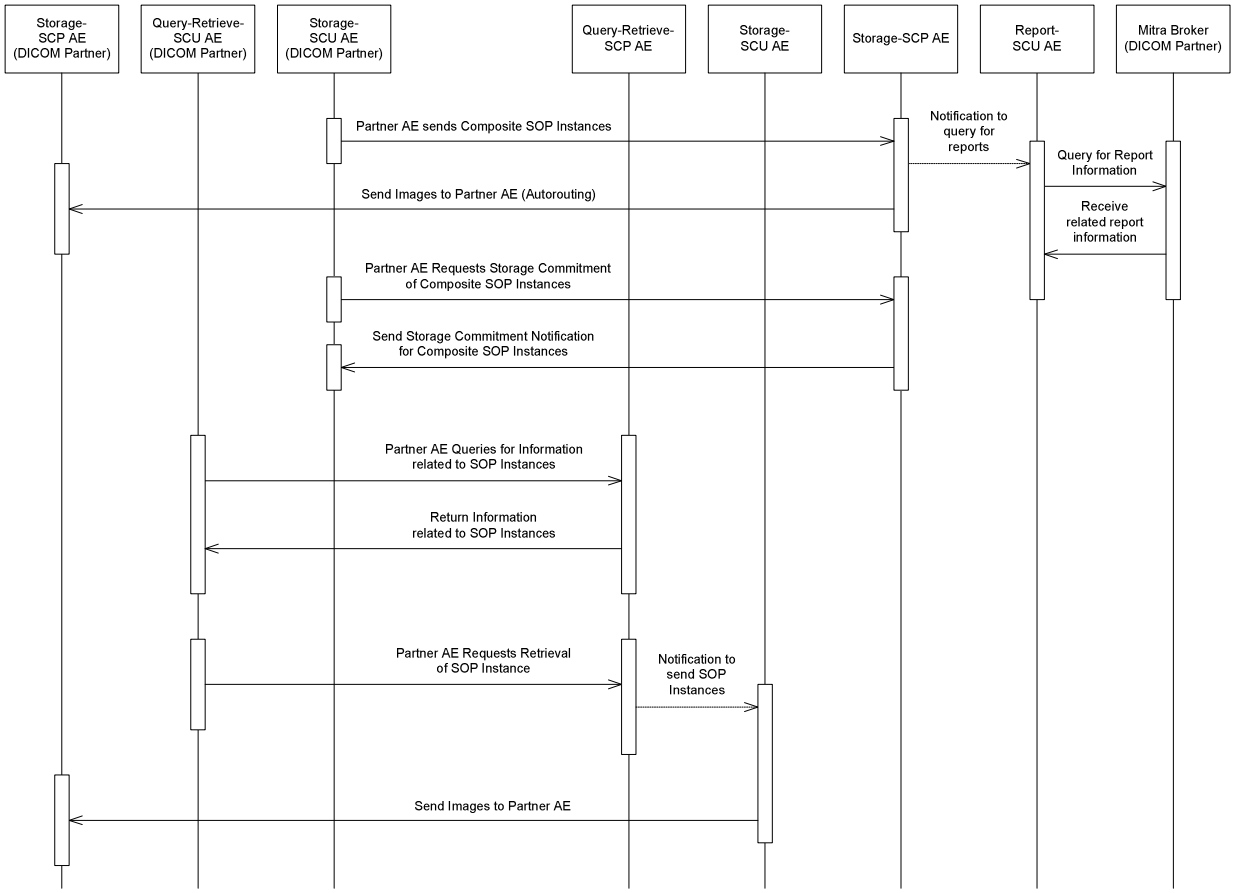

Figure 3: SEQUENCING CONSTRAINTS

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:

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Stored Print Storage	1.2.840.10008.5.1.1.27	Yes	No
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	Yes	No
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	Yes	No
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	No
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	No
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	No
Digital Mammography X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	No
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Yes	No
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	No
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Yes	No
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
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	No
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	No
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes	No
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	No
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	Yes	No
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	No
Ultrasound 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 Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	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
Mulfi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	Yes	No
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	Yes	No
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	No
General ECG Waveform Storage	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
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	Yes	No
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	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
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	Yes	No
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	No
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	Yes	No
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3	Yes	No
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	Yes	No
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	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 Spatial Registration 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 Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	No
Ophthalmic 8 bit Photography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	No
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	No
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	Yes	No
Basic Text Structured Reporting	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Enhanced Structured Reporting	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
Comprehensive Structured Reporting	1.2.840.10008.5.1.4.1.1.88.33	Yes	No
Procedure Log	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	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 Storage	1.2.840.10008.5.1.4.1.1.128	Yes	No
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	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
Radiotherapy Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Yes	No
Radiotherapy Summary Treatment 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 Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	Yes	No
CSA Non-Image Storage	1.3.12.2.1107.5.9.1	Yes	No
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	Yes	No

Table 3: SOP CLASSES FOR STORAGE-SCU AE

4.2.1.2 Association Establishment Policies

4.2.1.2.1 General

The STORAGE-SCU AE can only form Associations when requested to do so by the Local User, the QUERY-RETRIEVE-SCP AE or the STORAGE-SCP AE. The STORAGE-SCU AE can only request the opening of an Association. It cannot accept requests to open Associations from external Application Entities. The DICOM standard Application Context Name for DICOM 3.0 is always proposed:

Application Context Name	1.2.840.10008.3.1.1.1

Table 4: DICOM APPLICATION CONTEXT FOR STORAGE-SCU AE

4.2.1.2.2 Number of Associations

For each C-MOVE request one association to the C-MOVE Destination AE is established by the STORAGE-SCU AE. Since the configurable maximum number of simultaneous Query/Retrieve associations which are accepted by Visage 7 is limited by the License Key the maximum number of simultaneous associations requested by QUERY-RETRIEVE-SCP AE is also limited. One additional association can be requested by the Autorouter component. Up to 14 send jobs initiated by the Local Users can be performed simultaneously (8 high prior jobs, 4 medium prior jobs and 2 low prior jobs).

There is no separate limit on the maximum number permitted to the same C-MOVE Destination AE.

Maximum number of simultaneous Associations	Limited by License Key

Table 5: NUMBER OF ASSOCIATIONS AS A SCU FOR STORAGE-SCU AE

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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 6: ASYNCHRONOUS NATURE AS A SCU FOR STORAGE-SCU AE

4.2.1.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 7: DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE-SCU AE

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 Local User, the QUERY-RETRIEVE-SCP AE or the STORAGE-SCP AE invokes the STORAGE-SCU AE to transmit images. The Local User will issue such a command whenever patients, studies, series or instances are selected on the user interface and it is requested to send them to a preconfigured remote AE. The QUERY-RETRIEVE-SCP AE and the STORAGE-SCP AE will do this whenever a valid C-MOVE Request is received or if there are DICOM objects which should be autorouted. An Association Request is sent to the specified Destination AE and upon successful negotiation of the required Presentation Context the image transfer is started. All the indicated images are transmitted in a single association. 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. Only for User initiated send requests a retry mechanism is provided with the STORAGE-SCU AE to independently repeat the image sending a configurable number of times whenever a transmission error occurs.
Note that the STORAGE-SCU AE does not support the unsolicited sending of SOP Instances using the DICOM Storage Service Class. It will only send SOP Instances in response to a User Request, a C-MOVE Request from a partner AE or an initiated autorouting job.

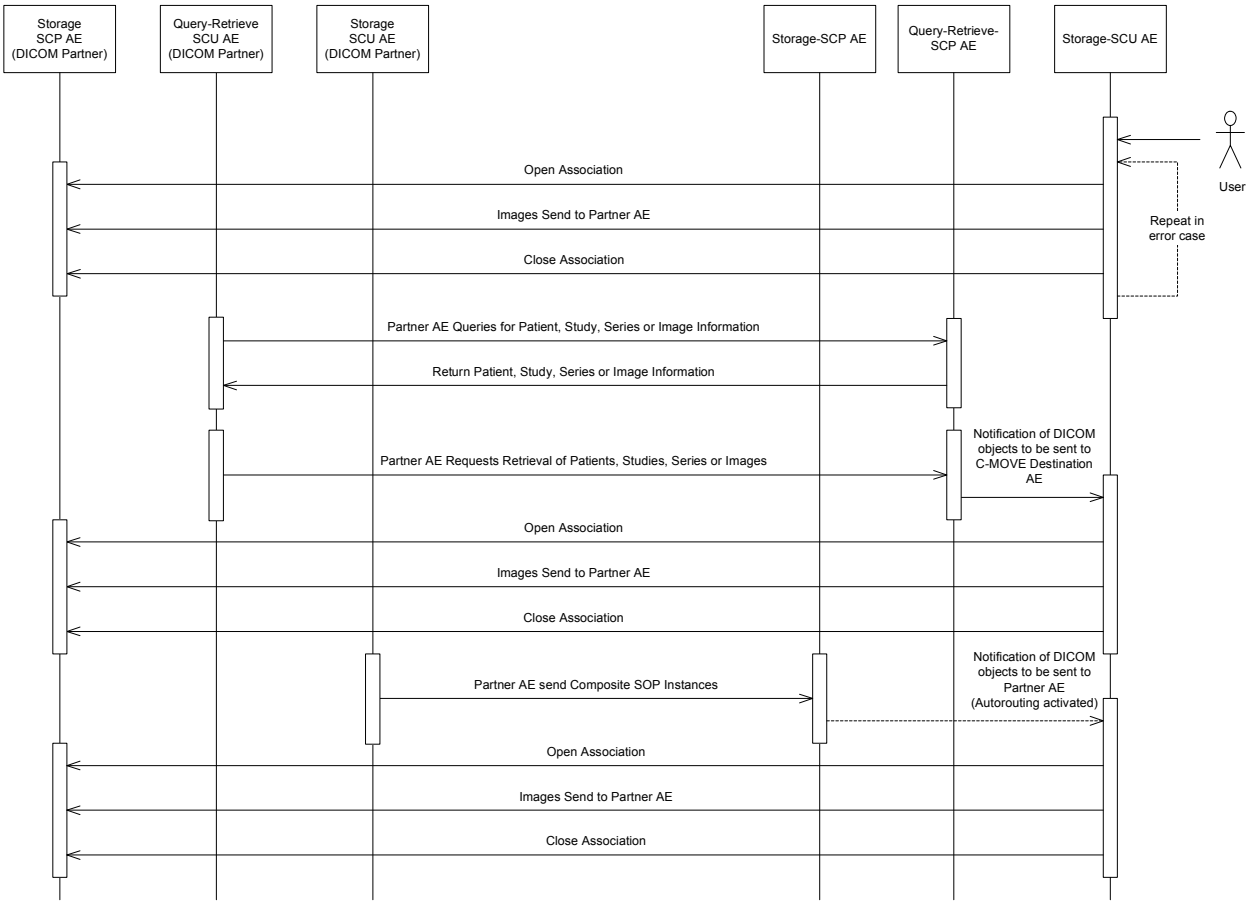

Figure 4: SEQUENCING OF ACTIVITY - SEND IMAGES

The following sequencing constraints illustrated in Figure 4 apply to the STORAGE-SCU AE for handling user initiated send requests:

1. User requests STORAGE-SCU AE to send the specified image Composite SOP Instances to the AEs selected as send destinations.
2. STORAGE-SCU AE opens a new association with the specified Destination AE.
3. STORAGE-SCU AE sends the indicated Composite SOP Instances.
4. STORAGE-SCU AE closes the association.
5. The send request is repeated a configurable number of times if transfer of SOP Instances failed.
6. The Verification Service is only supported as a utility function for Service staff. It is used only as a diagnostic tool.

The following sequencing constraints illustrated in Figure 4 apply to the STORAGE-SCU AE for handling DICOM object transfers after retrieve requests:

1. Partner AE requests retrieval of Patient, 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.

The following sequencing constraints illustrated in Figure 4 apply to the STORAGE-SCU AE for handling autorouting jobs:

1. Partner AE sends one or more Composite SOP Instances (C-STORE-RQ).
2. STORAGE-SCP AE signals STORAGE-SCU AE to forward the received Composite SOP Instances to the AEs configured as autorouting destinations.
3. STORAGE-SCU AE opens a new association with the specified 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

The STORAGE-SCU AE of Visage 7 will propose the Presentation Contexts as shown in Table 8.

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 Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Stored Print Storage	1.2.840.10008.5.1.1.27	see Table 9	see Table 9	SCU	None
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	see Table 9	see Table 9	SCU	None
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	see Table 9	see Table 9	SCU	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	see Table 9	see Table 9	SCU	None
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	see Table 9	see Table 9	SCU	None
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	see Table 9	see Table 9	SCU	None
Digital Mammography X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	see Table 9	see Table 9	SCU	None
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	see Table 9	see Table 9	SCU	None
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	see Table 9	see Table 9	SCU	None
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	see Table 9	see Table 9	SCU	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	see Table 9	see Table 9	SCU	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	see Table 9	see Table 9	SCU	None
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	see Table 9	see Table 9	SCU	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	see Table 9	see Table 9	SCU	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	see Table 9	see Table 9	SCU	None
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	see Table 9	see Table 9	SCU	None
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	see Table 9	see Table 9	SCU	None
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	see Table 9	see Table 9	SCU	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	see Table 9	see Table 9	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	see Table 9	see Table 9	SCU	None
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	see Table 9	see Table 9	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext.
Storage					
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	see Table 9	see Table 9	SCU	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	see Table 9	see Table 9	SCU	None
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	see Table 9	see Table 9	SCU	None
Mulfi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	see Table 9	see Table 9	SCU	None
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	see Table 9	see Table 9	SCU	None
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	see Table 9	see Table 9	SCU	None
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	see Table 9	see Table 9	SCU	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	see Table 9	see Table 9	SCU	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	see Table 9	see Table 9	SCU	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	see Table 9	see Table 9	SCU	None
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	see Table 9	see Table 9	SCU	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	see Table 9	see Table 9	SCU	None
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	see Table 9	see Table 9	SCU	None
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	see Table 9	see Table 9	SCU	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	see Table 9	see Table 9	SCU	None
Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.2	see Table 9	see Table 9	SCU	None
Pseudo-Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.3	see Table 9	see Table 9	SCU	None
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4	see Table 9	see Table 9	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	see Table 9	see Table 9	SCU	None
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	see Table 9	see Table 9	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	see Table 9	see Table 9	SCU	None
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	see Table 9	see Table 9	SCU	None
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3	see Table 9	see Table 9	SCU	None
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	see Table 9	see Table 9	SCU	None
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	see Table 9	see Table 9	SCU	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	see Table 9	see Table 9	SCU	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	see Table 9	see Table 9	SCU	None
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	see Table 9	see Table 9	SCU	None
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	see Table 9	see Table 9	SCU	None
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3	see Table 9	see Table 9	SCU	None
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	see Table 9	see Table 9	SCU	None
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	see Table 9	see Table 9	SCU	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	see Table 9	see Table 9	SCU	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	see Table 9	see Table 9	SCU	None
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	see Table 9	see Table 9	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext.
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	see Table 9	see Table 9	SCU	None
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	see Table 9	see Table 9	SCU	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	see Table 9	see Table 9	SCU	None
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	see Table 9	see Table 9	SCU	None
Ophthalmic 8 bit Photography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	see Table 9	see Table 9	SCU	None
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	see Table 9	see Table 9	SCU	None
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	see Table 9	see Table 9	SCU	None
Basic Text Structured Reporting	1.2.840.10008.5.1.4.1.1.88.11	see Table 9	see Table 9	SCU	None
Enhanced Structured Reporting	1.2.840.10008.5.1.4.1.1.88.22	see Table 9	see Table 9	SCU	None
Comprehensive Structured Reporting	1.2.840.10008.5.1.4.1.1.88.33	see Table 9	see Table 9	SCU	None
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	see Table 9	see Table 9	SCU	None
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	see Table 9	see Table 9	SCU	None
Key Object Selection	1.2.840.10008.5.1.4.1.1.88.59	see Table 9	see Table 9	SCU	None
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	see Table 9	see Table 9	SCU	None
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	see Table 9	see Table 9	SCU	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	see Table 9	see Table 9	SCU	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	see Table 9	see Table 9	SCU	None
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	see Table 9	see Table 9	SCU	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	see Table 9	see Table 9	SCU	None
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	see Table 9	see Table 9	SCU	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	see Table 9	see Table 9	SCU	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	see Table 9	see Table 9	SCU	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	see Table 9	see Table 9	SCU	None
Radiotherapy Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	see Table 9	see Table 9	SCU	None
Radiotherapy Summary Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.7	see Table 9	see Table 9	SCU	None
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	see Table 9	see Table 9	SCU	None
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	see Table 9	see Table 9	SCU	None
CSA Non-Image Storage	1.3.12.2.1107.5.9.1	see Table 9	see Table 9	SCU	None
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	see Table 9	see Table 9	SCU	None

Table 8: PROPOSED PRESENTATION CONTEXTS BY THE STORAGE-SCU AE

The table below describes the Transfer Syntaxes which are supported by the STORAGE-SCU AE.

Transfer Syntax Name	Transfer Syntax UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Default lossless JPEG Compressed	1.2.840.10008.1.2.4.70
Lossy JPEG 8 Bit Compressed	1.2.840.10008.1.2.4.50
Lossy JPEG 12 Bit Compressed	1.2.840.10008.1.2.4.51

RLE Compressed	1.2.840.10008.1.2.5

Table 9: STORAGE-SCU AE TRANSFER SYNTAXES

The DICOM objects requested from the QUERY-RETRIEVE-SCP AE by a partner AE are transferred to the C-MOVE Destination AE with the Transfer Syntax with which they are stored within the accessed compression level of Visage 7. The DICOM objects to be autorouted will be sent with the original Transfer Syntax with which they have been received by Visage 7 Online. Whenever a manual send process is initiated the User can select the compression level from which the DICOM objects are transferred.

In the following two situations the DICOM objects are converted to the default Transfer Syntax 'Implicit VR Little Endian' before they are transmitted:

- The C-MOVE Destination AE does not support the present compressed Transfer Syntax.
- The C-MOVE Destination AE is configured on the administration interface to receive only uncompressed DICOM objects.

Note: Wavelet compressed DICOM objects will never be transferred because there is no appropriate Transfer Syntax available.

4.2.1.3.1.3 SOP Specific Conformance for Verification SOP Class

The STORAGE-SCU AE provides standard conformance to the Verification SOP 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 Storage SOP Classes

Composite DICOM SOP Instances are maintained as DICOM Part 10 compliant files in the Visage 7 database. The entire set of tags received with the image will be saved in Visage 7; this includes all Private and SOP Extended Elements. When a SOP Instance is selected for sending from Visage 7, its content will be sent as it was originally received except the DICOM object was lossy compressed after reception. In this case a new SOP Instance UID and a new Series Instance UID is assigned to the object.

Note: A C-STORE Request is blocked by Visage 7 if the required SOP Instances are locked for a scheduled Patient Information Reconciliation (PIR) process.

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:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	The SCP has successfully stored the transferred SOP Instance. <u>User Request:</u> The successful transfer is displayed in the status dialog to the User. <u>Move Request:</u> A message is sent to the QUERY-RETRIEVE-SCP AE indicating successful transfer. The QUERY-RETRIEVE-SCP AE will send the appropriate PENDING or SUCCESS Status in the C-MOVE Response. No message is posted to the User Interface. <u>Autorouting Request:</u> A message is sent to the STORAGE-SCP AE indicating successful transfer. The STORAGE-SCP AE considers the job as done. No message is posted to the User Interface.

			Success indication message is stored in the Trace Database if Detailed Trace is switched on.
Refused	Out of Resources	0xA700	This is treated as a permanent Failure. User Request: The failed transfer is displayed in the status dialog to the User and it is continued transferring the next DICOM object. The STORAGE-SCU AE starts a retry mechanism for sending the SOP Instance. Move Request: A message is sent to the QUERY-RETRIEVE-SCP AE indicating a transfer failure and it is continued transferring the next DICOM object. The QUERY-RETRIEVE-SCP AE will send an appropriate Status in the C-MOVE Response. No message is posted to the User Interface. Autorouting Request: A message is sent to the STORAGE-SCP AE indicating a transfer failure and it is continued transferring the next DICOM object. The STORAGE-SCP AE starts a retry mechanism for sending the SOP Instance. No message is posted to the User Interface. Error indication message is stored in the Trace Database.
Error	Data Set does not match SOP Class	0xA900	
Error	Cannot Understand	0xC000	
Error	Processing Failure	0x0110	
Warning	Coercion of Data Elements	0xB000	Image transmission is considered successful. User Request: The successful transfer is displayed in the status dialog to the User. Move Request: A message is sent to the QUERY-RETRIEVE-SCP AE indicating successful transfer. The QUERY-RETRIEVE-SCP AE will send the appropriate PENDING or SUCCESS Status in the C-MOVE Response. No message is posted to the User Interface. Autorouting Request: A message is sent to the STORAGE-SCP AE indicating successful transfer. The STORAGE-SCP AE considers the job as done. No message is posted to the User Interface. Warning indication message is stored in the Trace Database.
Warning	Data Set does not match SOP Class	0xB007	
Warning	Elements Discarded	0xB006	
*	*	Any other status code	This is treated as a permanent Failure. User Request: The failed transfer is displayed in the status dialog to the User and it is continued transferring the next DICOM object. The STORAGE-SCU AE starts a retry mechanism for sending the SOP Instance. Move Request: A message is sent to the QUERY-RETRIEVE-SCP AE indicating an transfer failure and it is continued transferring the next DICOM object. The QUERY-RETRIEVE-SCP AE will send an appropriate Status in the C-MOVE Response. No message is posted to the User Interface. Autorouting Request: A message is sent to the STORAGE-SCP AE indicating a transfer failure and it is continued transferring the next DICOM object. The STORAGE-SCP AE starts a retry mechanism for sending the SOP Instance. No message is posted to the User Interface. Error indication message is stored in the Trace Database.

Table 10: STORAGE-SCU AE C-STORE RESPONSE STATUS HANDLING BEHAVIOR

All Status Codes indicating an error or refusal are treated as a permanent failure. The STORAGE-SCU AE only resends images automatically for User initiated send requests 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.

Exception	Behavior
Timeout expiry for an expected DICOM Message Response (DIMSE level timeout).	It is continued transferring the next DICOM object. User Request: The failed transfer is displayed in the status dialog to the User and it is continued transferring the next DICOM object. The STORAGE-SCU AE starts a retry mechanism for sending the SOP Instance. Move Request: A message is sent to the QUERY-RETRIEVE-SCP AE indicating an tranmsfer failure and it is continued transferring the next DICOM object. The QUERY-RETRIEVE-SCP AE will send an appropriate Status in the C-MOVE Response. No message is posted to the User Interface. Autorouting Request: A message is sent to the STORAGE-SCP AE indicating a transfer failure and it is continued transferring the next DICOM object. The STORAGE-SCP AE starts a retry mechanism for sending the SOP Instance. No message is posted to the User Interface. Error indication message is stored in the Trace Database.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout).	It is continued transferring the next DICOM object. User Request: The failed transfer is displayed in the status dialog to the User and it is continued transferring the next DICOM object. The STORAGE-SCU AE starts a retry mechanism for sending the SOP Instance. Move Request: A message is sent to the QUERY-RETRIEVE-SCP AE indicating a transfer failure and it is continued transferring the next DICOM object. The QUERY-RETRIEVE-SCP AE will send an appropriate Status in the C-MOVE Response. No message is posted to the User Interface. Autorouting Request: A message is sent to the STORAGE-SCP AE indicating a transfer failure and it is continued transferring the next DICOM object. The STORAGE-SCP AE starts a retry mechanism for sending the SOP Instance. No message is posted to the User Interface. Error indication message is stored in the Trace Database.
Association A-ABORTed by the SCP or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	User Request: The failed transfer is displayed in the status dialog to the User and the Association is released. The STORAGE-SCU AE starts a retry mechanism for sending the SOP Instance. Move Request: A message is sent to the QUERY-RETRIEVE-SCP AE indicating a transfer failure and the Association is released. The QUERY-RETRIEVE-SCP AE will send an appropriate Status in the C-MOVE Response. No message is posted to the User Interface. Autorouting Request: A message is sent to the STORAGE-SCP AE indicating a transfer failure and the Association is released. The STORAGE-SCP AE starts a retry mechanism for sending the SOP Instance. No message is posted to the User Interface. Error indication message is stored in the Trace Database.

Table 11: STORAGE-SCU AE COMMUNICATION FAILURE BEHAVIOR

4.2.1.4 Association Acceptance Policy

The STORAGE-SCU AE does not accept Associations.

4.2.2 Storage Commitment-SCU Application Entity Specification

4.2.2.1 SOP Classes

The STORAGE-SCU also acts as a Storage Commitment-SCU Application Entity and provides Standard Conformance to the following DICOM V3.0 SOP Classes:

SOP Class Name	SOP Class UID	SCU	SCP
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No

Table 12: SOP CLASSES FOR STORAGE COMMITMENT-SCU AE

4.2.2.2 Association Establishment Policies

4.2.2.2.1 General

The Storage Commitment-SCU AE only initiates Associations once a day, to requests commitment for SOP instances that have been sent by the STORAGE-SCU in the past to one remote AE. The DICOM standard Application Context Name for DICOM 3.0 is always proposed:

Application Context Name	1.2.840.10008.3.1.1.1

Table 13: DICOM APPLICATION CONTEXT FOR STORAGE COMMITMENT-SCU AE

4.2.2.2.2 Number of Associations

The number of simultaneous associations initiated for the Storage Commitment-SCU is technically is only restricted by the license, but it is typically one. This is because in the daily handling of Storage Commitment-SCU requests, all requests are sent in a serialized way.

Maximum number of simultaneous Associations	Limited by License Key

Table 14: NUMBER OF SIMULTANEOUS ASSOCIATIONS INITIATED FOR THE STORAGE COMMITMENT-SCU AE

The Storage Commitment-SCU AE accepts associations to receive N-EVENT-REPORT notifications for the Storage Commitment Push Model SOP Class. It can support multiple simultaneous Associations requested by the remote AE. Each time the Storage Commitment-SCU AE receives an Association, a child process will be spawned to process the Storage Commitment Push Model Service request. The maximum number of child processes, and thus the maximum number of simultaneous Associations that can be processed, is set by configuration. The maximum is limited by the License Key.

Maximum number of simultaneous Associations	- Limited by License Key - Restrictable by administrator
Maximum number of simultaneous Associations proposed by STORAGE-SCP AE	- Limited by License Key - Restrictable by administrator

Table 15: NUMBER OF SIMULTANEOUS ASSOCIATIONS ACCEPTED FOR THE STORAGE COMMITMENT-SCU AE

4.2.2.2.3 Asynchronous Nature

The Storage Commitment-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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 16: ASYNCHRONOUS NATURE AS A SCU FOR STORAGE COMMITMENT-SCU AE

4.2.2.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 17: DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE COMMITMENT-SCU AE

4.2.2.3 Association Initiation Policy

4.2.2.3.1 Activity – Request Commitment for Sent Images

4.2.2.3.1.1 Description and Sequencing of Activity

Only one remote AE can be configured as Storage Commitment-SCP AE. If a remote AE is configured as Storage Commitment-SCP, the Storage Commitment-SCU will store, for each SOP Instance sent to the remote AE, a pending commitment in the local database. When a configurable number of days have passed after sending the image, once a day for all due pending commitments, Storage Commitment Push Model requests (N-ACTION) are sent to the remote AE. The maximum number of SOP Instances in a Storage Commitment request is configurable, and if the number of due pending commitments is larger, several Storage Commitment requests with different Transaction UIDs are sent.

For each N-ACTION accociation, on receive of the N-ACTION response the Storage Commitment-SCU AE will release the association.

The notification of storage commitment (N-EVENT-REPORT) will be received over a separate association (see section 4.2.2.4.1.1).

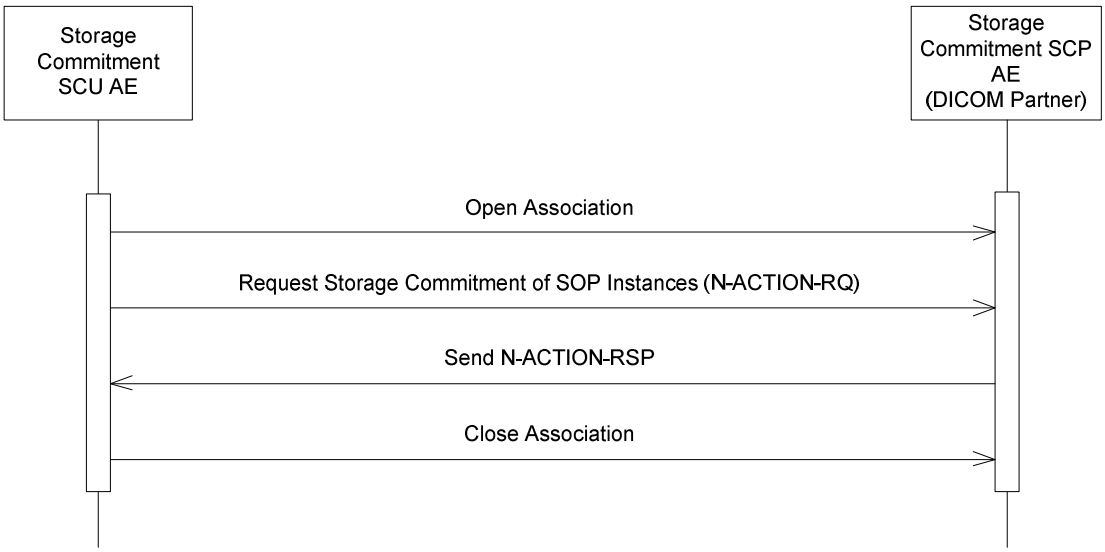

Figure 5: SEQUENCING OF ACTIVITY – REQUEST STORAGE COMMITMENT

The following sequencing constraints illustrated in Figure 5 apply to the Storage Commitment-SCU AE to initiate Storage Commitment Push Model Requests (N-ACTION-Requests). The remote AE acts as Image Manager / Image Archive device. Typically, this workflow makes sense for an online Visage system, which cannot itself commit to permanently store SOP Instances.

1. Storage Commitment-SCU opens an Association with the remote STORAGE-SCP AE.
2. Storage Commitment-SCU requests Storage Commitment of SOP Instance(s) (Storage Commitment-SCU sends N-ACTION-RQ and partner responds with N-ACTION-RSP to indicate that it received the request).
3. Storage Commitment-SCU closes the Association.

Receiving the N-EVENT-REPORT reponse from the partner is covered in section 4.2.2.4.1.1.

4.2.2.3.1.2 Proposed Presentation Contexts

The Storage Commitment-SCU AE will propose the Presentation Contexts as shown in Table 18.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

Table 18: PROPOSED PRESENTATION CONTEXTS BY THE STORAGE-SCP AE

4.2.2.3.1.3 SOP Specific Conformance for Storage Commitment Push Model SOP Class

The Storage Commitment-SCU does not use the optional Storage Media File-Set ID & UID attributes in the N-ACTION Request.

The Storage Commitment-SCU AE supports Storage Commitment Push Model requests for SOP Instances of any of the Storage SOP Classes that are also supported by the STORAGE-SCU AE. SOP Instances of different SOP Classes can be contained in one N-ACTION Request.

The Storage Commitment-SCU AE treats status codes in a N-ACTION response as follows:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	The commitment of all SOP Instances referenced in the Storage Commitment-SCU request is set to submitted.
*	*	Any other status code	The commitment of all SOP Instances referenced in the Storage Commitment-SCU request is set to not commited.

Table 19: STORAGE COMMITMENT-SCU AE N-ACTION-RSP STATUS RETURN BEHAVIOR

The Storage Commitment-SCU AE during communication failure is summarized in the following table:

Exception	Behavior
Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. the Storage Commitment-SCU 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. Error indication message is stored in the Trace Database. No message is posted to the User Interface.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout). I.e. The Storage Commitment-SCU AE is waiting for the next N-ACTION Data Set PDU but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error indication message is stored in the Trace Database. No message is posted to the User Interface.
Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	Error indication message is stored in the Trace Database. No message is posted to the User Interface.

Table 20: STORAGE COMMITMENT-SCU AE STORAGE COMMITMENT PUSH MODEL COMMUNICATION FAILURE BEHAVIOR

4.2.2.4 Association Acceptance Policy

4.2.2.4.1 Activity – Handling Storage Commitment Responses

4.2.2.4.1.1 Description and Sequencing of Activity

The Storage Commitment-SCU AE accepts N-EVENT-REPORT Associations only if they have valid Presentation Contexts. If none of the requested Presentation Contexts are accepted then the Association Request itself is rejected. Only associations with Application Entity Titles of DICOM partner nodes will be accepted that are configured on the administration interface.

The Transaction UID contained in a N-EVENT-REPORT message will be matched against Transaction UIDs that have been sent before to the Storage Commitment-SCP node in an N-ACTION-Request. If no matching Transaction UID is found, the association will return with the error code “unrecognized operation”. Only if the Transaction UIDs match, the commitment or non-commitment of the SOP Instances in the response will be stored in the local database of the Storage Commitment-SCU AE.

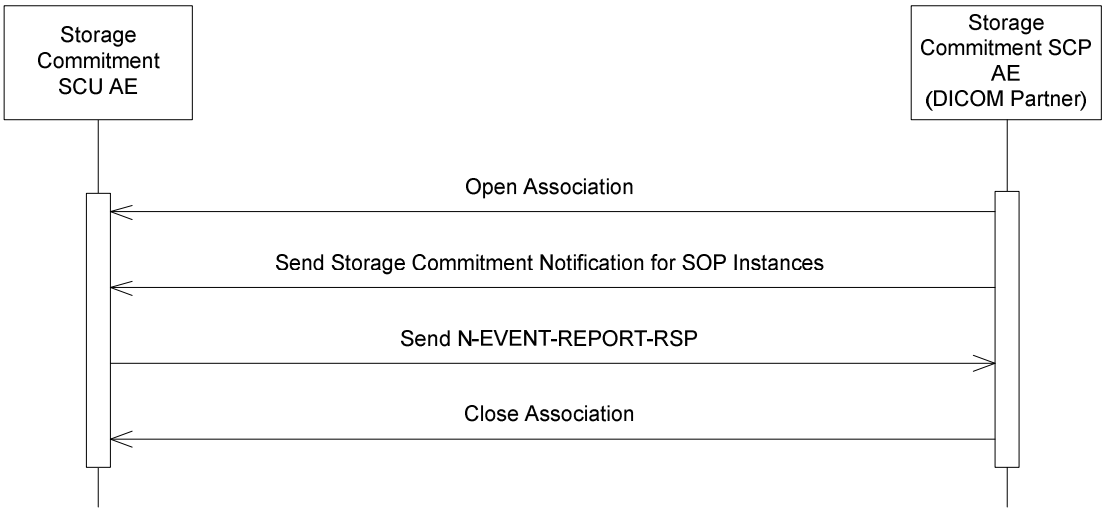

Figure 6: SEQUENCING OF ACTIVITY – RECEIVE STORAGE COMMITMENT RESPONSE

The following sequencing constraints illustrated in Figure 6 apply to the Storage Commitment-SCU AE to receive Storage Commitment Push Model Responses (N-EVENT-REPORT). It continues the sequence from section 4.2.2.3.1.1. The remote AE acts as Image Manager / Image Archive device. Typically, this workflow makes sense for an online Visage system, which cannot itself commit to permanently store SOP Instances.

4. Partner opens an Association with the Store Commitment-SCU AE.
5. Partner sends Storage Commitment Push Model Notification (N-EVENT-REPORT).
6. Store Commitment-SCU AE returns a N-EVENT-REPORT-RSP Message to the Partner.
7. Partner closes the Association with the Store Commitment-SCU AE.

4.2.2.4.1.2 Accepted Presentation Contexts

The Storage Commitment-SCU AE of Visage 7 will accept the Presentation Contexts as shown in Table 21.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

Table 21: ACCEPTED PRESENTATION CONTEXTS BY THE STORAGE-COMMITMENT SCU AE

4.2.2.4.1.3 SOP Specific Conformance for Storage Commitment Push Model SOP Class

The behavior of the Storage Commitment-SCU AE when receiving Event Types within the N-EVENT-REPORT is summarized in the following table:

Event Type Name	Event Type ID	Behavior
Storage Commitment Request Successful	1	The Storage Commitment SCU AE expects existence of a Referenced SOP Sequence (0008,1199). It marks the SOP Instances in the Referenced SOP Sequence (0008,1199) as commited. If a Failed SOP Sequence (0008,1198) exists, it marks the SOP Instances in this sequence as non commited.
Storage Commitment Request Complete – Failures Exist	2	The Storage Commitment SCU AE expects existence of a the Failed SOP Sequence (0008,1198). It marks the SOP Instances in the Failed SOP Sequence (0008,1198) as not commited. If a Referenced SOP Sequence (0008,1199) exists, it marks the SOP Instances in this sequence as commited.

Table 22: STORAGE COMMITMENT-SCU AE N-EVENT-REPORT EVENT TYPE RETURN BEHAVIOR

The associated Activity with the Storage Commitment Push Model service is used by the Storage Commitment-SCU AE as confirmation that the remote AE, typically an Image Manager acting as external archive, has permanently stored SOP Instances that have been sent to it. This commitment is stored in the local database of the Store Commitment-SCU AE. In current Visage versions, this commitment is not directly used. In future version of Visage, commited images can be preferably deleted from a Visage Online system (automatically or user-controled).

The Storage Commitment-SCU AE will return the Status Code values in N-EVENT-REPORT Responses as shown in the following table:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	The SCP has successfully received the Storage Commitment Push Model N-EVENT-REPORT request. It can store the commitments for the indicated SOP Instances.
Error	Unrecognized Operation	0x0221	The Transaction UID in the N-EVENT-REPORT request is not recognized (was never sent within an N-ACTION request by the Storage Commitment-SCU AE)
	Invalid argument value	0x0115	Indicates that the action information value specified was out of range or otherwise inappropriate. Error message is stored in the Trace Database. The Storage Commitment Resonse will not be stored.
	Unable to process	0x0110	An internal processing error occurred which makes further processing of the storage commitment request impossible. Error message is stored in the Trace Database. The Storage Commitment Resonse will not be stored.

Table 23: STORAGE COMMITMENT-SCU AE N-EVENT-REPORT RESPONSE STATUS RETURN BEHAVIOR

4.2.3 STORAGE-SCP Application Entity Specification

4.2.3.1 SOP Classes

The STORAGE-SCP AE provides Standard Conformance to the DICOM V3.0 SOP Classes listed in the table below. The received DICOM objects that are indicated by the last column can be displayed by the WEB Clients. Each Storage SOP Class can be configured via the administration interface to be discarded after reception.

SOP Class Name	SOP Class UID	SCU	SCP	View-able
Verification	1.2.840.10008.1.1	No	Yes	-
Stored Print Storage	1.2.840.10008.5.1.1.27	No	Yes	-
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	No	Yes	
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	No	Yes	
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	Yes	X
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	No	Yes	
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	No	Yes	X
Digital Mammography X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	No	Yes	
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	No	Yes	X
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	No	Yes	
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	No	Yes	X
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes	X
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	Yes	X
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	No	Yes	X
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes	X
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	No	Yes	X
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	No	Yes	X
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	No	Yes	
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	No	Yes	X
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	No	Yes	X
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	Yes	X
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes	X
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	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	
Mulfi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	No	Yes	X
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	No	Yes	
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	No	Yes	
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	No	Yes	
General ECG Waveform Storage	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	
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	No	Yes	
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	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

Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	No	Yes	X
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	No	Yes	X
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	No	Yes	X
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3	No	Yes	X
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	No	Yes	X
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	No	Yes	X
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	No	Yes	X
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 Spatial Registration 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	X
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	X
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	X
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	No	Yes	
Ophthalmic 8 bit Photography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	No	Yes	X
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	No	Yes	X
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	No	Yes	
Basic Text Structured Reporting	1.2.840.10008.5.1.4.1.1.88.11	No	Yes	X**Error! Bookmark not defined.**
Enhanced Structured Reporting	1.2.840.10008.5.1.4.1.1.88.22	No	Yes	X**Error! Bookmark not defined.**
Comprehensive Structured Reporting	1.2.840.10008.5.1.4.1.1.88.33	No	Yes	X**Error! Bookmark not defined.**
Procedure Log	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	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 Storage	1.2.840.10008.5.1.4.1.1.128	No	Yes	X
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	No	Yes	
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	No	Yes	X
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	
Radiotherapy Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	No	Yes	
Radiotherapy Summary Treatment 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 Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	No	Yes	
CSA Non-Image Storage	1.3.12.2.1107.5.9.1	No	Yes	
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	No	Yes	

Table 24: SOP CLASSES FOR STORAGE-SCP AE

4.2.3.2 Association Establishment Policies

4.2.3.2.1 General

The STORAGE-SCP AE will never initiate Associations; it only accepts Association Requests from external DICOM Aes. The STORAGE-SCP AE will accept Associations for Verification, Storage and Storage Commitment Push Model Service requests.
The DICOM standard Application Context Name for DICOM 3.0 is always accepted:

Application Context Name	1.2.840.10008.3.1.1.1

Table 25: DICOM APPLICATION CONTEXT FOR STORAGE-SCP AE

4.2.3.2.2 Number of Associations

The STORAGE-SCP AE can support multiple simultaneous Associations requested by partner 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 request. The maximum number of child processes, and thus the maximum number of simultaneous Associations that can be processed, is set by configuration. The maximum is limited by the License Key.

The STORAGE-SCP AE initiates one Association for each Storage Commitment Push Model request to send N-EVENT-REPORTs to partner Aes.

Maximum number of simultaneous Associations	- Limited by License Key - Restrictable by administrator
Maximum number of simultaneous Associations proposed by STORAGE-SCP AE	- Limited by License Key - Restrictable by administrator

Table 26: NUMBER OF SIMULTANEOUS ASSOCIATIONS AS AN SCP FOR STORAGE-SCP AE

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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 27: ASYNCHRONOUS NATURE AS A SCP FOR STORAGE-SCP AE

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

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

Table 28: OUTSTANDING STORAGE COMMITMENT PUSH MODEL REQUESTS FOR STORAGE-SCP AE

4.2.3.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 29: DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE-SCP AE

4.2.3.3 Association Initiation Policy

4.2.3.3.1 Activity – Send Storage Commitment Notification

4.2.3.3.1.1 Description and Sequencing of Activity

The STORAGE-SCP AE will always initiate a new Association for sending back Storage Commitment Push Model Notification (N-EVENT-REPORT). The original Association used to send the corresponding request will never be used for that.

An Association Request is sent to the partner 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 partner AE then the STORAGE-SCP AE will send them always over sparate Associations. The Association will be released when the N-EVENT-REPORT for the partner AE has been sent. If any type of error occurs during transmission (either a communication failure or indicated by a Status Code returned by the partner AE) over an open Association then the transfer of N-EVENT-REPORTs is halted. A new Association will be opened to retry sending outstanding N-EVENT-REPORTs. The maximum number of times the STORAGE-SCP AE will attempt to resend an N-EVENT-REPORT is configurable, along with the amount of time to wait between attempts to resend.

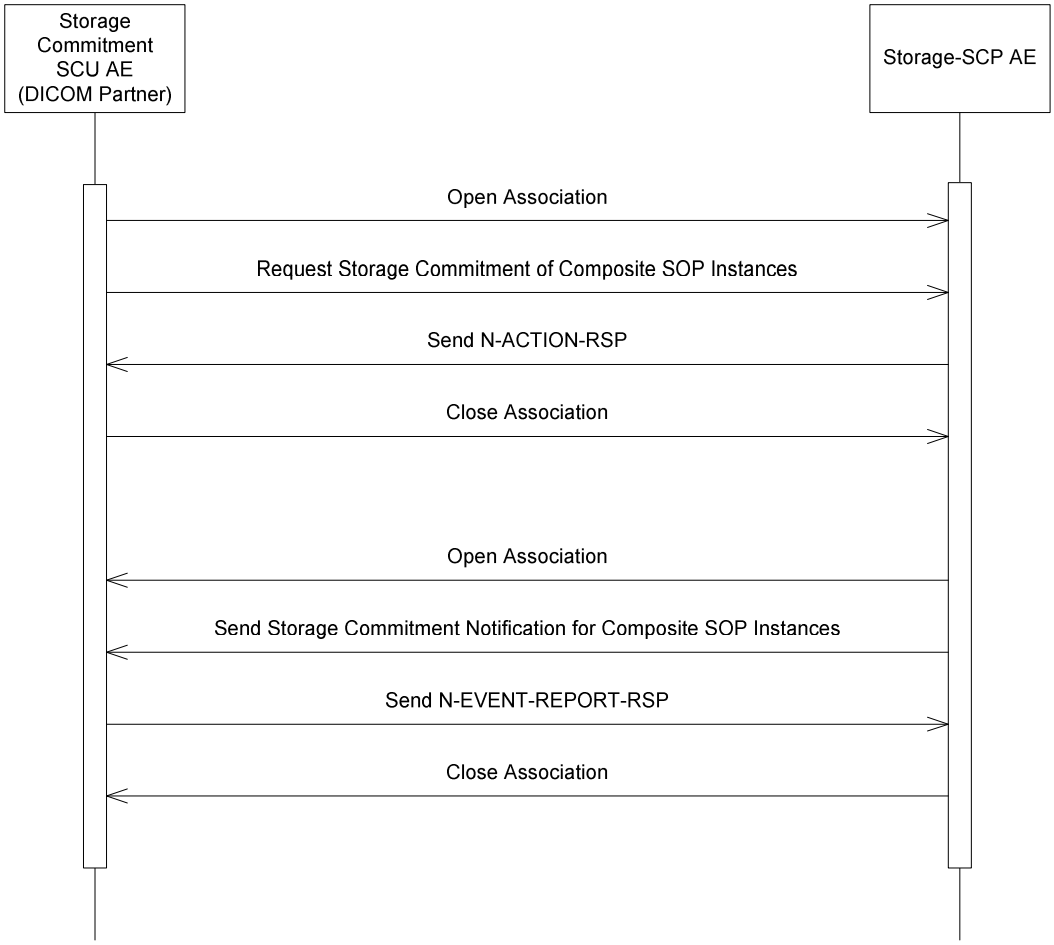

Figure 7: SEQUENCING OF ACTIVITY – SEND STORAGE COMMITMENT NOTIFICATION

The following sequencing constraints illustrated in Figure 7 apply to the STORAGE-SCP AE for handling Storage Commitment Push Model Requests (N-ACTION-Requests):

1. Partner AE opens an Association with the STORAGE-SCP AE.
2. Partner AE requests Storage Commitment of Composite SOP Instance(s) (partner sends N-ACTION-RQ and STORAGE-SCP AE responds with N-ACTION-RSP to indicate that it received the request).
3. Partner AE closes the Association.
4. STORAGE-SCP AE opens an Association with the partner AE.
5. STORAGE-SCP AE sends Storage Commitment Push Model Notification (N-EVENT-REPORT).
6. Partner AE returns a N-EVENT-REPORT-RSP Message to the STORAGE-SCP AE.
7. STORAGE-SCP AE closes the Association with the partner AE.
8. The send request is repeated a configurable number of times if transfer of N-EVENT-REPORT failed.

4.2.3.3.1.2 Proposed Presentation Contexts

The STORAGE-SCP AE will propose the Presentation Contexts as shown in Table 30.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext. Neg.**
Name	**UID**	**Name**	**UID**		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None

Table 30: PROPOSED PRESENTATION CONTEXTS BY THE STORAGE-SCP AE

4.2.3.3.1.3 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 partner Aes that it has committed to permanently store Composite SOP Instances that have been sent to it. It thus allows Partner Aes to determine whether Visage 7 has taken responsibility for the archiving of specific SOP Instances so that they can be flushed from the partner AE system.

The maximum response time is configurable (time between receiving N-ACTION-RQ and sending N-EVENT-REPORT) because it is not predictable how image producing systems react if the Storage Commitment request handling takes more time than expected. Such situations can occur because the start time for migrating DICOM objects from Visage 7 Online to Visage 7 Archive is arbitrary. Since Storage Commitment can only be given for objects located in Visage 7 Archive the commitment check will be performed when the migration process is done. The configured response time maximum makes sure that the Storage Commitment check is executed within the allowed time regardless of the current migration state.

4.2.3.4 Association Acceptance Policy

4.2.3.4.1 Activity – Handling Storage and Storage Commitment Requests

4.2.3.4.1.1 Description and Sequencing of Activity

The STORAGE-SCP AE accepts Associations only if they have valid Presentation Contexts. If none of the requested Presentation Contexts are accepted then the Association Request itself is rejected. Only associations with Application Entity Titles of DICOM partner nodes will be accepted that are configured on the administration interface.

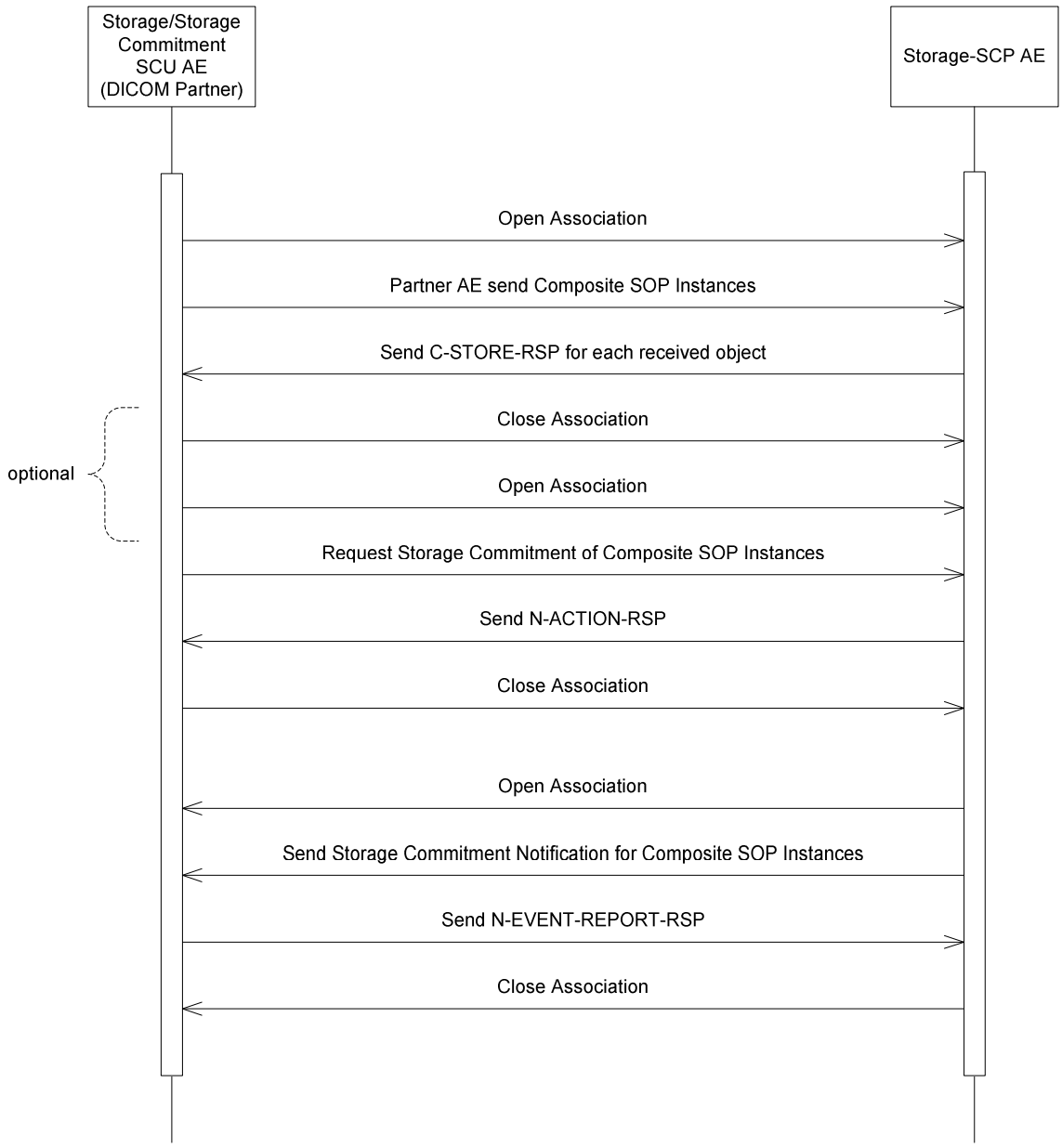

Figure 8: SEQUENCING OF ACTIVITY – RECEIVE IMAGES AND STORAGE COMMITMENT REQUESTS

The following sequencing constraints illustrated in Figure 8 apply to the STORAGE-SCP AE for handling image receiving (C-STORE-Requests):

1. Partner AE opens an Association with the STORAGE-SCP AE.
2. Partner AE sends one or more Composite SOP Instances.
3. STORAGE-SCP AE returns a C-STORE-RSP Message to the Partner AE with the storage status.
4. Partner AE closes the Association. Note that the Partner AE does not have to close the Association immediately. Further C-STORE Requests can be sent over the Association before it is closed.
5. Partner AE opens an Association with the STORAGE-SCP AE.
6. Partner AE requests Storage Commitment of Composite SOP Instance(s) (partner sends N-ACTION-RQ and STORAGE-SCP AE responds with N-ACTION-RSP to indicate that it received the request).
7. Partner AE closes the Association.
8. STORAGE-SCP AE opens an Association with the Partner AE.
9. STORAGE-SCP AE sends Storage Commitment Push Model Notification (N-EVENT-REPORT).
10. Partner AE returns a N-EVENT-REPORT-RSP Message to the STORAGE-SCP AE.
11. STORAGE-SCP AE closes the Association with the Partner AE.

The STORAGE-SCP AE may reject Association attempts as shown in Table 31. 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)

Result	Source	Reason/Diag	Explanation
2 - rejected-transient	c	2 - local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
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. If the Promiscuous Mode is switched on the Association requests from any STORE SCU Partner AE is accepted.
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.

Table 31: ASSOCIATION REJECTION REASONS

4.2.3.4.1.2 Accepted Presentation Contexts

The STORAGE-SCP AE of Visage 7 will accept the Presentation Contexts as shown in Table 32.

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 Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None
Stored Print Storage	1.2.840.10008.5.1.1.27	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	see Table 33	see Table 33	SCP	None
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	see Table 33	see Table 33	SCP	None
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	see Table 33	see Table 33	SCP	None
Digital X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	see Table 33	see Table 33	SCP	None
Digital X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	see Table 33	see Table 33	SCP	None
Digital Mammography X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	see Table 33	see Table 33	SCP	None
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	see Table 33	see Table 33	SCP	None
Digital Intra-oral X-Ray Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	see Table 33	see Table 33	SCP	None
Digital Intra-oral X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	see Table 33	see Table 33	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	see Table 33	see Table 33	SCP	None
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	see Table 33	see Table 33	SCP	None
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	see Table 33	see Table 33	SCP	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	see Table 33	see Table 33	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	see Table 33	see Table 33	SCP	None
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	see Table 33	see Table 33	SCP	None
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	see Table 33	see Table 33	SCP	None
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	see Table 33	see Table 33	SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	see Table 33	see Table 33	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	see Table 33	see Table 33	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	see Table 33	see Table 33	SCP	None
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	see Table 33	see Table 33	SCP	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	see Table 33	see Table 33	SCP	None
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	see Table 33	see Table 33	SCP	None
Mulfi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	see Table 33	see Table 33	SCP	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext.**
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	see Table 33	see Table 33	SCP	None
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	see Table 33	see Table 33	SCP	None
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	see Table 33	see Table 33	SCP	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	see Table 33	see Table 33	SCP	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	see Table 33	see Table 33	SCP	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	see Table 33	see Table 33	SCP	None
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	see Table 33	see Table 33	SCP	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	see Table 33	see Table 33	SCP	None
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	see Table 33	see Table 33	SCP	None
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	see Table 33	see Table 33	SCP	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	see Table 33	see Table 33	SCP	None
Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.2	see Table 33	see Table 33	SCP	None
Pseudo-Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.3	see Table 33	see Table 33	SCP	None
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4	see Table 33	see Table 33	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	see Table 33	see Table 33	SCP	None
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	see Table 33	see Table 33	SCP	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	see Table 33	see Table 33	SCP	None
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	see Table 33	see Table 33	SCP	None
X-Ray Angiographic Bi-Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3	see Table 33	see Table 33	SCP	None
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	see Table 33	see Table 33	SCP	None
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	see Table 33	see Table 33	SCP	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	see Table 33	see Table 33	SCP	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	see Table 33	see Table 33	SCP	None
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	see Table 33	see Table 33	SCP	None
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	see Table 33	see Table 33	SCP	None
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3	see Table 33	see Table 33	SCP	None
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	see Table 33	see Table 33	SCP	None
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	see Table 33	see Table 33	SCP	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	see Table 33	see Table 33	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	see Table 33*	see Table 33*	SCP	None
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	see Table 33	see Table 33	SCP	None
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	see Table 33*	see Table 33*	SCP	None
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	see Table 33	see Table 33	SCP	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	see Table 33	see Table 33	SCP	None
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	see Table 33*	see Table 33*	SCP	None
Ophthalmic 8 bit Photography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	see Table 33	see Table 33	SCP	None
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	see Table 33	see Table 33	SCP	None

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Ext.**
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	see Table 33	see Table 33	SCP	None
Basic Text Structured Reporting	1.2.840.10008.5.1.4.1.1.88.11	see Table 33	see Table 33	SCP	None
Enhanced Structured Reporting	1.2.840.10008.5.1.4.1.1.88.22	see Table 33	see Table 33	SCP	None
Comprehensive Structured Reporting	1.2.840.10008.5.1.4.1.1.88.33	see Table 33	see Table 33	SCP	None
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	see Table 33	see Table 33	SCP	None
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	see Table 33	see Table 33	SCP	None
Key Object Selection	1.2.840.10008.5.1.4.1.1.88.59	see Table 33	see Table 33	SCP	None
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	see Table 33	see Table 33	SCP	None
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	see Table 33	see Table 33	SCP	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	see Table 33	see Table 33	SCP	None
Standalone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	see Table 33	see Table 33	SCP	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	see Table 33	see Table 33	SCP	None
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	see Table 33	see Table 33	SCP	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	see Table 33	see Table 33	SCP	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	see Table 33	see Table 33	SCP	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	see Table 33	see Table 33	SCP	None
Radiotherapy Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	see Table 33	see Table 33	SCP	None
Radiotherapy Summary Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.7	see Table 33	see Table 33	SCP	None
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	see Table 33	see Table 33	SCP	None
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	see Table 33	see Table 33	SCP	None
CSA Non-Image Storage	1.3.12.2.1107.5.9.1	see Table 33	see Table 33	SCP	None
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	see Table 33	see Table 33	SCP	None

Table 32: ACCEPTED PRESENTATION CONTEXTS BY THE STORAGE-SCP AE

The Table 21 below describes the Transfer Syntaxes which are supported by the STORAGE-SCP AE. If multiple Transfer Syntaxes are proposed in a Presentation Context then only the most preferable Transfer Syntax is accepted. The preference order corresponds to the order of Transfer Syntaxes listed in the table.

However, if the parameter *DicomPortal PreferredTransferSyntax* in the DICOMWebConfig database table is set to the string *uncompressed* than Explicit VR Little Endian and Implicit VR Little Endian are prefered over the other transfer syntaxes.

* For the SOP classes Video Endoscopic Image Storage, Video Microscopic Image Storage, and Video Photographic Image Storage also the transfer syntax MPEG2 MP@ML (1.2.840.10008.1.2.4.100) will be accepted in addition to the transfer syntaxes listed in Table 21.

Transfer Syntax Name	**Transfer Syntax UID**
Default lossless JPEG Compressed	1.2.840.10008.1.2.4.70
Lossy JPEG 8 Bit Compressed	1.2.840.10008.1.2.4.50
Lossy JPEG 12 Bit Compressed	1.2.840.10008.1.2.4.51
RLE Compressed	1.2.840.10008.1.2.5
Explicit VR Little Endian	1.2.840.10008.1.2.1

Implicit VR Little Endian	1.2.840.10008.1.2

Table 33: STORAGE-SCP AE TRANSFER SYNTAXES

Note:

To make some STORAGE-SCU partner DICOM nodes work it is desired to accept DICOM Objects of certain SOP Classes even though they should not be stored within Visage 7. Each Storage SOP Class can be configured via the administration interface to be discarded after reception.

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 Visage 7 database to support query and retrieval requests.

The behavior for handling duplicate SOP Instances is configurable via administration interface. The default behavior is to replace the original object with the conflicting SOP Instance UID by the new SOP Instance. An alternative configuration is possible that causes the new received SOP Instance to be discarded.

If SOP Instances are compressed in a lossy format by Visage 7 new SOP Instance UIDs and new Series Instance UIDs are assigned to these objects. Additionally Reference UIDs will be resolved to keep the cross references persistent. Following information string with the quality factor is written to the attribute Derivation Description (0008,2111) to mark the SOP Instance as lossy compressed by Visage 7. If Matrix Reduction is used to reduce the image size the Resacale Factor is appended.

```
DCM_WEB: PEG lib Lossy_Quality=80; RescaleFac=0.500000
```

Presentation State objects will also be adjusted if referenced SOP Instances are lossy compresed by Visage 7. The Transformation information is stored within the Presentation State objects by using the private creator Visage (0009,00xx) and the private attributes Compression Type (0009,xx10) and LUT Transformation (0009,xx11).

Since Visage 7 can only display HTML Reports, received Structured Report SOP Instances are originally stored in the system and additionally converted into HTML format. See Annex 8.2 for a detailed conversion description.

For the purposes of image display the system supports the following photometric interpretations: MONOCHROME1, MONOCHROME2, RGB, PALETTE COLOR, YBR FULL 422, and YBR FULL.

Note:
Enhanced CT and MR SOP Instances containing supplemental Palette Color LUTs will never be compressed by Visage 7 but only stored in the original compression format in Visage 7 Online and Visage 7 Archive even though compression is configured. Visage 7 identifies such images by analyzing the attribute Pixel Presentation (0008,9205). If the contained value is different from 'MONOCHROME' image compression will not be performed.

Caution: Visage 7 Online is not an archive. Normally, no images are stored forever. Only employment of Visage 7 Archive guarantees long term image storage.

The STORAGE-SCP AE will return the Status Code values in C-STORE Responses as shown in the following table.

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	The Composite SOP Instance was successfully received and stored temporarily on the hard disk. A 'Success' status indicates not that the SOP Instance is verified and stored in the system database. Note: If the belonging SOP Class UID is configured to be discarded the response status is also set to 'Success'.
Refused	Out of Resources	0xA700	Indicates that there was not enough disk space to store the image. Error message is stored in the Trace Database. The SOP Instance will not be saved.
Error	Data Set does not match SOP Class	0xA900	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 elements which are necessary to store the object on hard disk. Error message is stored in the Trace Database. The SOP Instance will not be saved.
	Unable to process	0x0110	An internal processing error occurred which makes further processing of the store request impossible. Error message is stored in the Trace Database. The SOP Instance will not be saved.

Table 34: STORAGE-SCP AE C-STORE RESPONSE STATUS RETURN BEHAVIOR

Note:
If a failure condition does occur when handling an Association then all images previously received successfully over the Association are maintained in the Visage 7 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

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

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. 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. Error indication message is stored in the Trace Database. No message is posted to the User Interface.
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. 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. Error indication message is stored in the Trace Database. No message is posted to the User Interface.
Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	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. Error indication message is stored in the Trace Database. No message is posted to the User Interface.

Table 35: STORAGE-SCP AE STORAGE SERVICE COMMUNICATION FAILURE BEHAVIOR

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 partner Aes that it has committed to permanently store Composite SOP Instances that have been sent to it. It thus allows partner Aes to determine whether Visage 7 has taken responsibility for the archiving of specific SOP Instances so that they can be flushed from the partner AE system.

The STORAGE-SCP AE caches the Storage Commitment Push Model N-ACTION Requests in the database to enable processing of received requests after a restart of Visage 7. The Storage Commitment check is executed as soon as the specified Composite SOP Instances are received by Visage 7 and migrated to Visage 7 Archive. A configurable maximum response time makes an earlier Storage Commitment check possible.

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 STORAGE-SCP AE will always initiate a new Association for sending back Storage Commitment Push Model Notification (N-EVENT-REPORT). The original Association used to send the corresponding request will never be used for that. If the Partner AE is not accessible for receiving the Notification request the send process is repeated. The number of retries and the delay time between the retries can be configured on the administration interface.

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

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

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

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	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	Invalid argument value	0x0115	Indicates that the action information value specified was out of range or otherwise inappropriate. Error message is stored in the Trace Database. The Storage Commitment Request will not be performed.
	Unable to process	0x0110	An internal processing error occurred which makes further processing of the storage commitment request impossible. Error message is stored in the Trace Database. The Storage Commitment Request will not be performed.

Table 36: STORAGE-SCP AE N-ACTION RESPONSE STATUS RETURN BEHAVIOR

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:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	The SCU has successfully received the Storage Commitment Push Model N-EVENT-REPORT Request. Success indication message is stored in the Trace Database if Detailed Trace is switched on. No message is posted to the User Interface.
*	*	Any other status code	This is treated as a temporary Failure. A retry mechanism is started for sending the N-EVENT-REPORT Request again. Error indication message is stored in the Trace Database. No message is posted to the User Interface.

Table 37: STORAGE-SCP AE N-ACTION RESPONSE STATUS RETURN BEHAVIOR

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

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

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. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is stored in the Trace Database. No message is posted to the User Interface.
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 N-ACTION Data Set PDU but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is stored in the Trace Database. No message is posted to the User Interface.
Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	Any previously received Storage Commitment Push Model N-ACTION Requests will still be fully processed. Error indication message is stored in the Trace Database. No message is posted to the User Interface.

Table 38: STORAGE-SCP AE STORAGE COMMITMENT PUSH MODEL COMMUNICATION FAILURE BEHAVIOR

4.2.4 Query-SCU Application Entity Specification

4.2.4.1 SOP Classes

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

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	No

Table 39: SOP CLASSES FOR QUERY-SCU AE

4.2.4.2 Association Establishment Policies

4.2.4.2.1 General

The QUERY-SCU AE forms Associations when requested to do so by the user or by the Prefetch component. The QUERY-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:

Application Context Name	1.2.840.10008.3.1.1.1

Table 40: DICOM APPLICATION CONTEXT FOR QUERY-SCU AE

4.2.4.2.2 Number of Associations

It is not possible to perform several associations simultaneously. Only one association at a time can be handled by the QUERY-SCU AE. An association must be completed before a new operation can be initiated.

Maximum number of simultaneous Associations	1 (Not Configurable)

Table 41: NUMBER OF ASSOCIATIONS AS A SCU FOR QUERY-SCU AE

4.2.4.2.3 Asynchronous Nature

The QUERY-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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 42: ASYNCHRONOUS NATURE AS A SCU FOR QUERY-SCU AE

4.2.4.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 43: DICOM IMPLEMENTATION CLASS AND VERSION FOR QUERY-SCU AE

4.2.4.3 Association Initiation Policy

4.2.4.3.1 Activity – Send Query Requests to an External Peer AE

4.2.4.3.1.1 Description and Sequencing of Activity

The QUERY-SCU AE will initiate a new Association when the user performs the query action from the user interface or a query is initiated by the Prefetch component. An Association Request is sent to the specified QUERY-SCP AE and upon successful negotiation of the required Presentation Context the query is started. The result messages are transmitted in the same association. The QUERY-SCU AE will not attempt to independently retry the query request if an error occurs. It is configurable to perform a Verification before the query is started in order to test the remote application.

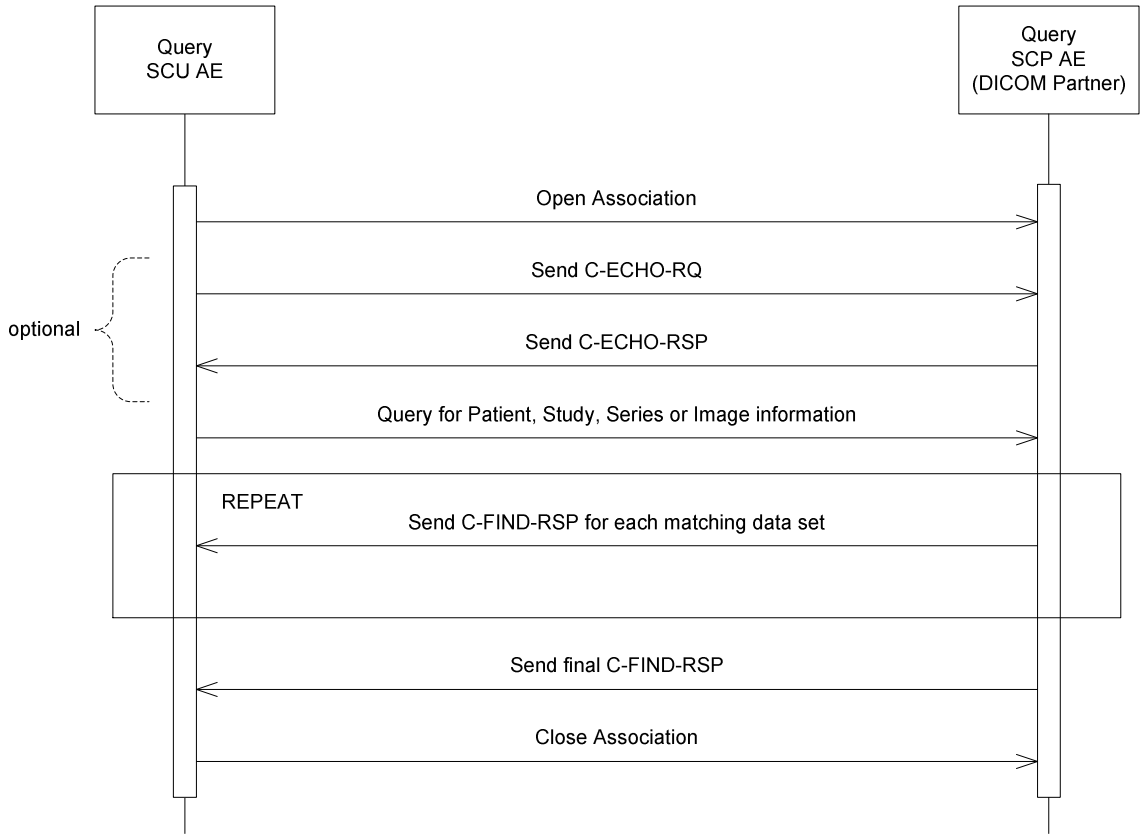

Figure 9: SEQUENCING OF ACTIVITY – PERFOMING QUERY REQUESTS

The following sequencing constraints illustrated in Figure 9 apply to the QUERY-SCU AE for initiating queries (C-FIND-Requests):

1. QUERY-SCU AE opens an Association with the Partner AE.
2. QUERY-SCU AE sends a C-ECHO-RQ Message (configurable).
3. Partner AE sends a C-ECHO-RSP Message (if configured).
4. QUERY-SCU AE sends a C-FIND-RQ Message.
5. Partner AE returns a C-FIND-RSP Message to the QUERY-SCU AE with matching information. A C-FIND-RSP is sent for each entity matching the identifier specified in the C-FIND-RQ. A final C-FIND-RSP is sent indicating that the matching is complete.
6. QUERY-SCU AE closes the Association.

4.2.4.3.1.2 Proposed Presentation Contexts

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

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 Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

Table 44: PROPOSED PRESENTATION CONTEXTS BY THE QUERY-SCU AE

4.2.4.3.1.3 SOP Specific Conformance for Verification SOP Class

The QUERY-SCU AE provides standard conformance to the Verification SOP Class as an SCU.

4.2.4.3.1.4 SOP Specific Conformance for Query SOP Classes

The QUERY-SCU AE provides standard conformance to the supported C-FIND SOP Classes. Only a single information model, Study Root, is supported. All queries initiated by Visage Web Client are performed at the highest level of the information model (the STUDY level). The Visage Client initiated queries are performed either on STUDY or SERIES level. The supported attributes are listed in the table bellow. The Attribute Names that are used in former versions of the DICOM Standard are added in brackets. The last four columns have following meanings:

User Input:	User can specify a matching value as filter criteria.
Wildcard appended:	The wildcard '*' is appended to the user input automatically.
Value displayed:	The return value is displayed on the web interface.
Prefetch Query:	Attribute is used for prefetch querys. (only *Patient ID* is used if patient match strategy is set to 'PatientID')

Level Name Attribute Name	Tag	VR	Types of Matching	User Input	Wildcard appended	Value displayed	Prefetch Query
Study Level (Visage Web Client)							
Patient‘s Name	(0010,0010)	PN	wild card, universal	X	X	X	X
Patient ID	(0010,0020)	LO	wild card, universal	X	X	X	X
Patient´s Birth Date	(0010,0030)	DA	universal			X	X
Patient´s Sex	(0010,0040)	CS	universal			X	X
Patient Comments	(0010,4000)	LT	wild card, universal	X	X	X	
Study Instance UID	(0020,000D)	UI	universal				
Study ID	(0020,0010)	SH	wild card, universal	X	X		
Study Date	(0008,0020)	DA	single value, range, universal	X		X	
Study Time	(0008,0030)	TM	universal			X	
Accession Number	(0008,0050)	SH	wild card, universal	X	X	X	
Modalities in Study	(0008,0061)	CS	single value, universal	X			
Referring Physician’s Name	(0008,0090)	PN	single value, universal	X	X	X	
Study Description	(0008,1030)	LO	wild card, universal	X	X	X	
Number of Study Related Instances (Number of Study Related Images)	(0020,1208)	IS	universal			X	
Study Level (Visage Client)							
Patient's Name	(0010,0010)	PN	wild card, universal	X		X	
Patient ID	(0010,0020)	LO	wild card, universal	X		X	
Study Date	(0008,0020)	DA	single value, range, universal	X		X	
Study Time	(0008,0030)	TM	universal			X	
Accession Number	(0008,0050)	SH	wild card, universal	X		X	
Study Description	(0008,1030)	LO	wild card, universal	X		X	
Study Instance UID	(0020,000D)	UI	universal				
Study ID	(0020,0010)	SH	universal				
Series Level (Visage Client)							
Series Date	(0008,0021)	DA	universal			X	
Series Time	(0008,0031)	TM	universal			X	
Modality	(0008,0060)	CS	universal			X	
Series Description	(0008,103E)	LO	universal			X	
Series Instance UID	(0020,000E)	UI	universal				
Series Number	(0020,0011)	IS	universal				
Number of Series Related Instances (Number of Series Related Images)	(0020,1209)	IS	universal			X	

Table 45: STUDY ROOT C-FIND SCU REQUESTED ELEMENTS

Note:

Visage 7 can be configured to display either the Instance Availability (0008,0056) or the Storage Media File-set ID (0088,0130) Data Element as Archive Status in the user interface if one of them is provided with the C-FIND response by the DICOM Partner node.

4.2.4.4 Association Acceptance Policy

The QUERY-SCU AE does not accept Associations.

4.2.5 Retrieve-SCU Application Entity Specification

4.2.5.1 SOP Classes

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

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Study Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No

Table 46: SOP CLASSES FOR RETRIEVE-SCU AE

4.2.5.2 Association Establishment Policies

4.2.5.2.1 General

The RETRIEVE-SCU AE forms Associations when requested to do so by the user or by the Prefetch component. The RETRIEVE-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:

Application Context Name	1.2.840.10008.3.1.1.1

Table 47: DICOM APPLICATION CONTEXT FOR RETRIEVE-SCU AE

4.2.5.2.2 Number of Associations

For each C-MOVE request one association to the C-MOVE Destination AE is established by the RETRIEVE-SCU AE. Retrieve requests initiated from the user interface will be stored in a job queue and up to 14 retrieve jobs can be performed simultaneously (8 high prior jobs, 4 medium prior jobs and 2 low prior jobs).

Maximum number of simultaneous Associations	Up to 14 (Not Configurable)

Table 48: NUMBER OF ASSOCIATIONS AS A SCU FOR RETRIEVE-SCU AE

4.2.5.2.3 Asynchronous Nature

The RETRIEVE-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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 49: ASYNCHRONOUS NATURE AS A SCU FOR RETRIEVE-SCU AE

4.2.5.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 50: DICOM IMPLEMENTATION CLASS AND VERSION FOR RETRIEVE-SCU AE

4.2.5.3 Association Initiation Policy

4.2.5.3.1 Activity – Send Retrieve Requests to an External Peer AE

4.2.5.3.1.1 Description and Sequencing of Activity

The RETRIEVE-SCU AE will initiate a new Association when the user performs the retrieve action from the user interface or a retrieve is initiated by the Prefetch component. An Association Request is sent to the specified RETRIEVE-SCP AE and upon successful negotiation of the required Presentation Context the retrieve is started. The response messages are transmitted in the same association. For transferring the requested SOP Instances the RETRIEVE-SCP AE has to establish an Association with the the STORAGE-SCP AE of Visage 7. It is not possible to configure another C-MOVE Destination than the own STORAGE-SCP AE. The RETRIEVE-SCU AE will not attempt to independently retry the retrieve request if an error occurs.

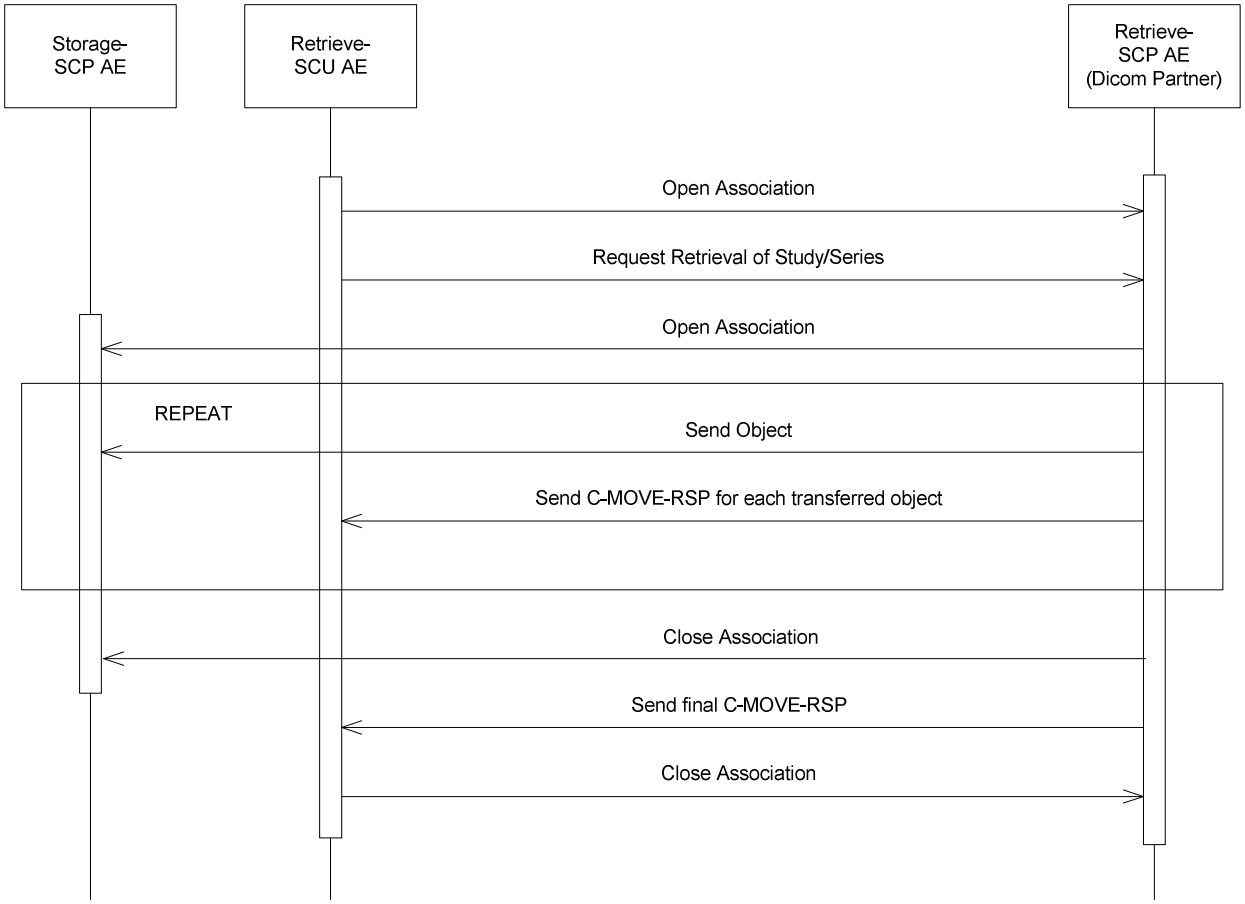

Figure 10: SEQUENCING OF ACTIVITY – PERFOMING RETRIEVE REQUESTS

The following sequencing constraints illustrated in Figure 10 apply to the RETRIEVE-SCU AE for initiating retrieves (C-MOVE-Requests):

1. RETRIEVE-SCU AE opens an Association with the Partner AE.
2. RETRIEVE-SCU AE sends a C-MOVE-RQ Message.
3. Partner AE sends the Composite SOP Instances to the STORAGE-SCP AE.
4. Partner AE sends a C-MOVE-RSP Message to the RETRIEVE-SCU AE for each transferred SOP Instance.
5. Partner AE sends a final C- MOVE-RSP indicating that the SOP Instance transfer is complete.
6. RETRIEVE-SCU AE closes the Association.
7. The Verification Service is only supported as a utility function for Service staff. It is used only as a diagnostic tool.

4.2.5.3.1.2 Proposed Presentation Contexts

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

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 Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Study Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

Table 51: PROPOSED PRESENTATION CONTEXTS BY THE RETRIEVE-SCU AE

4.2.5.3.1.3 SOP Specific Conformance for Verification SOP Class

The RETRIEVE-SCU AE provides standard conformance to the Verification SOP Class as an SCU. The Verification Service as an SCU is actually only supported as a diagnostic service tool for network communication issues.

4.2.5.3.1.4 SOP Specific Conformance for Retrieve SOP Classes

RETRIEVE-SCU AE provides standard conformance to the supported C-MOVE SOP Classes. Only a single information model, Study Root, is supported. All retrieves initiated by Visage Web Client are performed at the highest level of the information model (the STUDY level) so the Study Instance UID is the Request Identifier. The Visage Client initiated retrieves are performed either on STUDY or SERIES level so the Request identifier is the Study Instance UID resp. the Series Instance UID. Lists of UIDs will not be used for multiple study/series retrieves within a single retrieve request.

The instances are retrieved to the current application's local database since the destination is always the AE Title of the STORE-SCP AE of the local application.

Note:

It is not necessary to configure the RETRIEVE-SCP AE as a STORAGE SCU on the administration interface of Visage 7 to allow the partner AE to send SOP Instances after a retrieve request. A partner AE configured as a MOVE-SCP has always the permission to send DICOM objects to Visage 7.

4.2.5.4 Association Acceptance Policy

The RETRIEVE-SCU AE does not accept Associations.

4.2.6 QUERY-RETRIEVE-SCP Application Entity (Level A) Specification

Visage 7 stores received DICOM objects in two different compression levels specified as Level A and Level B. The compression type can be configured for each level via administration interface. If Visage 7 Archive is present the DICOM objects are additionally stored with the original or lossless compressed format (configurable) in the Archive Level. The Query/Retrieve-SCU AE decides which Level is accessed for Query and Retrieve requests by using the appropriate AE Title that is assigned to each Level.

This chapter describes the DICOM behavior of the QUERY-RETRIEVE-SCP AE which represents the compression Level A.

4.2.6.1 SOP Classes

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

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
Patient Study Only Information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	No	Yes
Patient Study Only Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	No	Yes

Table 52: SOP CLASSES FOR QUERY-RETRIEVE-SCP AE (Level A)

4.2.6.2 Association Establishment Policies

4.2.6.2.1 General

The QUERY-RETRIEVE-SCP AE will never initiate Associations; it only accepts Association Requests from external DICOM Aes. 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:

Application Context Name	1.2.840.10008.3.1.1.1

Table 53: DICOM APPLICATION CONTEXT FOR QUERY-RETRIEVE-SCP AE (LEVEL A)

4.2.6.2.2 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 set by configuration. The maximum is limited by the License Key.

Maximum number of simultaneous Associations	- Limited by License Key - Restrictable by administrator

Table 54: NUMBER OF ASSOCIATIONS AS A SCP FOR QUERY-RETRIEVE-SCP AE

4.2.6.2.3 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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 55: ASYNCHRONOUS NATURE AS A SCP FOR QUERY-RETRIEVE-SCP AE

4.2.6.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 56: DICOM IMPLEMENTATION CLASS AND VERSION FOR QUERY-RETRIEVE-SCP AE

4.2.6.3 Association Initiation Policy

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

4.2.6.4 Association Acceptance Policy

4.2.6.4.1 Activity – Handling Query and Retrieval Requests

4.2.6.4.1.1 Description and Sequencing of Activity

The QUERY-RETRIEVE-SCP AE accepts Associations only if they have valid Presentation Contexts. If none of requested Presentation Contexts are accepted then the Association Request itself is rejected. Only associations with Application Entity Titles of DICOM partner nodes will be accepted that are configured on the administration interface. If QUERY-RETRIEVE-SCP AE receives a query (C-FIND) request then the response(s) will be sent over the same Association used to send the C-FIND-Request.

If QUERY-RETRIEVE-SCP AE receives a retrieval (C-MOVE) request then the responses will be sent over the same Association used to send the C-MOVE-Request. The QUERY-RETRIEVE-SCP AE will notify the STORAGE-SCU to send the requested SOP Instances to the C-MOVE Destination. The STORAGE-SCU AE notifies the QUERY-RETRIEVE-SCP AE of the success or failure of each attempt to send a Composite SOP Instance to the partner 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.

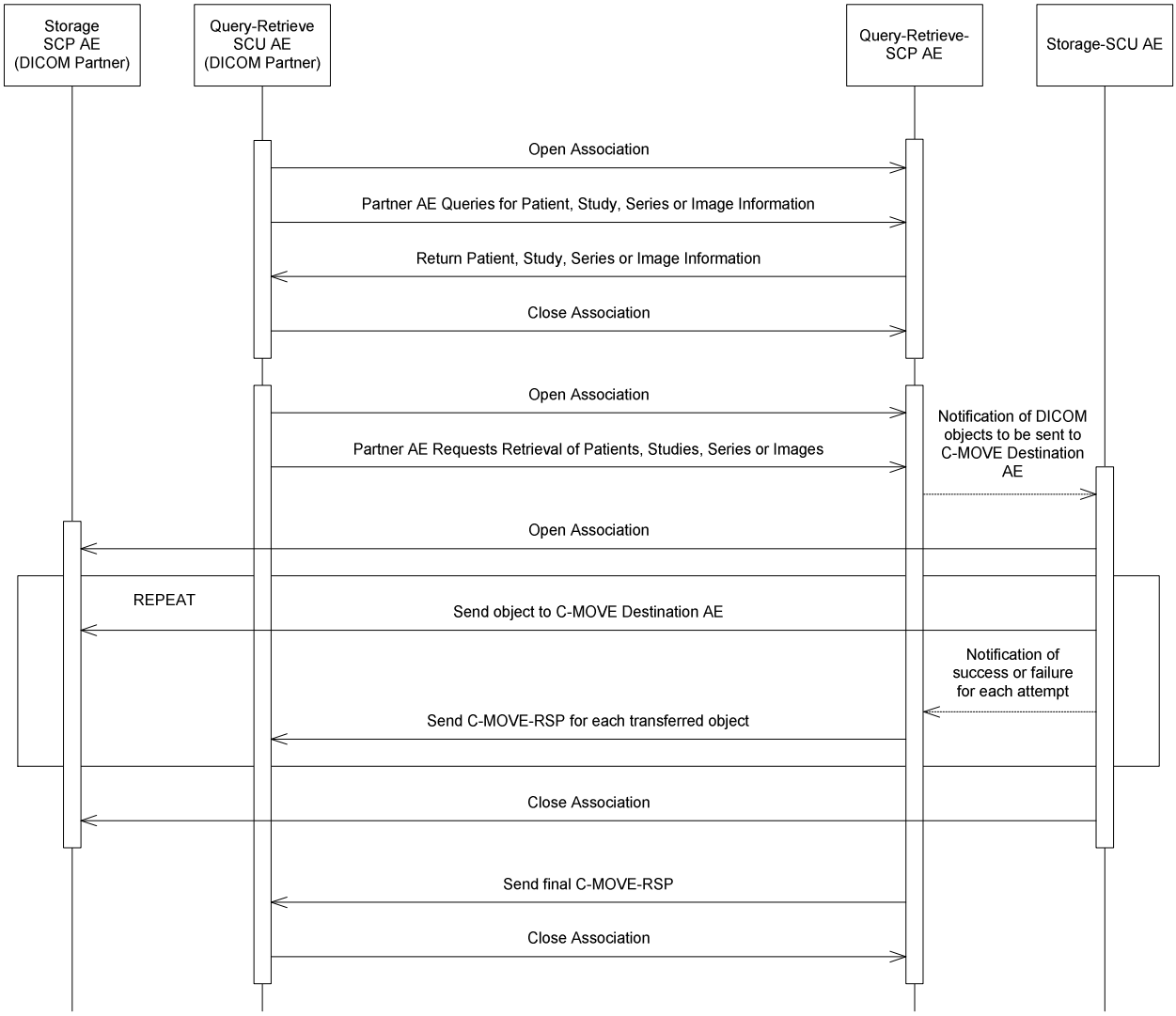

Figure 11: SEQUENCING OF ACTIVITY – HANDLING QUERY AND RETRIEVAL REQUESTS

The following sequencing constraints illustrated in Figure 11 apply to the QUERY-RETRIEVE-SCP AE for handling queries (C-FIND-Requests):

1. Partner AE opens an Association with the QUERY-RETRIEVE-SCP AE.
2. Partner AE sends a C-FIND-RQ Message.
3. QUERY-RETRIEVE-SCP AE returns a C-FIND-RSP Message to the Partner 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. Partner AE closes the Association. Note that the Partner 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 11 apply to the QUERY-RETRIEVE-SCP AE for handling retrievals (C-MOVE-Requests):

1. Partner AE opens an Association with the QUERY-RETRIEVE-SCP AE.
2. Partner AE sends a C-MOVE-RQ Message.
3. QUERY-RETRIEVE-SCP AE notifies the STORAGE-SCU AE to send the Composite SOP Instances to the Partner 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. Partner AE closes the Association. Note that the Partner 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 57. 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)

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
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. If the Promiscuous Mode is switched on the Association request is accepted and then aborted instead.
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.

Table 57: ASSOCIATION REJECTION REASONS

4.2.6.4.1.2 Accepted Presentation Contexts

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

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 Explicit VR Little Endian	1.2.840.10008.1.2 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 Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None
Patient Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None
Study Root Q/R Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None
Study Root Q/R Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None
Patient Study Only Information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None
Patient Study Only Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None

Table 58: ACCEPTED PRESENTATION CONTEXTS BY THE QUERY-RETRIEVE-SCP AE

4.2.6.4.1.3 SOP Specific Conformance for Verification SOP Class

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

4.2.6.4.1.4 SOP Specific Conformance for Query SOP Classes

The QUERY-RETRIEVE-SCP AE supports hierarchical queries and not relational queries. The attributes Query/Retrieve Level (0008,0052) and Retrieve AE Title (0008,0054) are returnd by default. Query responses always return values from the Visage 7 database.

Patient Root Information Model

All unique keys have to be supplied according to the selected Query/Retrieve Level. The supported attributes on the various retrieve levels are listed in the following. Lists of UIDs are also supported except for Patient Level.

Patient Level:	Patient ID	(0010,0020)
Study Level:	Study Instance UID	(0020,000D)
Series Level:	Series Instance UID	(0020,000E)
Image Level:	SOP Instance UID	(0008,0018)

Study Root Information Model

All unique keys have to be supplied according to the selected Query/Retrieve Level. The supported attributes on the various retrieve levels are listed in the following. Lists of UIDs are also supported.

Study Level:	Study Instance UID	(0020,000D)
Series Level:	Series Instance UID	(0020,000E)
Image Level:	SOP Instance UID	(0008,0018)

Patient/Study Only Information Model

All unique keys have to be supplied according to the selected Query/Retrieve Level. The supported attributes on the various retrieve levels are listed in the following. Lists of UIDs are also supported except for Patient Level.

Patient Level:	Patient ID	(0010,0020)
Study Level:	Study Instance UID	(0020,000D)

The supported attributes on the various query levels of the three implemented information models are listed in the following tables. The Attribute Names that are used in former versions of the DICOM Standard are added in brackets. The private attributes are marked with an appropriate label.

Level Name Attribute Name	Tag	VR	Types of Matching
Patient Level			
Patient‘s Name	(0010,0010)	PN	single value, wild card, universal
Patient ID	(0010,0020)	LO	single value, wild card, universal
Patient´s Birth Date	(0010,0030)	DA	single value, range, universal
Patient´s Sex	(0010,0040)	CS	single value, wild card, universal
Patient Comments	(0010,4000)	LT	single value, wild card, universal
Number of Patient Related Studies	(0020,1200)	IS	universal
Number of Patient Related Series	(0020,1202)	IS	universal
Number of Patient Related Instances (Number of Patient Related Images)	(0020,1204)	IS	universal
Study Level			
Study Instance UID	(0020,000D)	UI	single value, universal
Study ID	(0020,0010)	SH	single value, wild card, universal
Study Date	(0008,0020)	DA	single value, range, universal
Study Time	(0008,0030)	TM	single value, range, universal
Accession Number	(0008,0050)	SH	single value, wild card, universal
Referring Physician’s Name	(0008,0090)	PN	single value, wild card, universal
Modalities in Study	(0008,0061)	CS	single value, wild card, universal
Study Description	(0008,1030)	LO	single value, wild card, universal
Study Comments	(0032,4000)	LT	single value, wild card, universal
Name of Physician(s) Reading Study	(0008,1060)	PN	single value, wild card, universal
Number of Study Related Series	(0020,1206)	IS	universal
Number of Study Related Instances (Number of Study Related Images)	(0020,1208)	IS	universal
Series Level			
Series Instance UID	(0020,000E)	UI	single value, universal
Series Number	(0020,0011)	IS	single value, wild card, universal
Modality	(0008,0060)	CS	single value, wild card, universal
Series Date	(0008,0021)	DA	single value, range, universal
Series Time	(0008,0031)	TM	single value, range, universal
Series Description	(0008,103E)	LO	single value, wild card, universal
Performing Physician’s Name	(0008,1050)	PN	single value, wild card, universal
Body Part Examined	(0018,0015)	CS	single value, wild card, universal

Manufacturer	(0008,0070)	LO	single value, wild card, universal
Request Attribute Sequence	(0040,0275)	SQ	universal
>Requested Procedure ID	(0040,1001)	SH	single value, wild card, universal
>Scheduled Procedure Step ID	(0040,0009)	SH	single value, wild card, universal
Performed Procedure Step Start Date	(0040,0244)	DA	single value, range, universal
Performed Procedure Step Start Time	(0040,0245)	TM	single value, range, universal
Number of Series Related Instances (Number of Series Related Images)	(0020,1209)	IS	universal
Image Level			
SOP Instance UID	(0008,0018)	UI	single value, universal
SOP Class UID	(0008,0016)	UI	single value, universal
Content Date (Image Date)	(0008,0023)	DA	single value, range, universal
Content Time (Image Time)	(0008,0033)	TM	single value, range, universal
Instance Number (Image Number)	(0020,0013)	IS	single value, wild card, universal
Number of Frames	(0028,0008)	IS	single value, wild card, universal
Rows	(0028,0010)	US	single value, wild card, universal
Columns	(0028,0011)	US	single value, wild card, universal
Bits Allocated	(0028,0100)	US	single value, wild card, universal
Referenced Request Sequence	(0040,A370)	SQ	universal
>Study Instance UID	(0020,000D)	UI	universal
>Accession Number	(0008,0050)	SH	universal
>Requested Procedure ID	(0040,1001)	SH	universal
>Requested Procedure Code Sequence	(0032,1064)	SQ	universal
>>Code Value	(0008,0100)	SH	universal
>>Coding Scheme Designator	(0008,0102)	SH	universal
>>Coding Scheme Version	(0008,0103)	SH	universal
>>Code Meaning	(0008,0104)	LO	universal
Content Template Sequence	(0040,A504)	SQ	universal
>Template Identifier	(0040,DB00)	CS	universal
Concept Name Code Sequence	(0040,A043)	SQ	universal
>Code Value	(0008,0100)	SH	universal
>Coding Scheme Designator	(0008,0102)	SH	universal
>Coding Scheme Version	(0008,0103)	SH	universal
>Code Meaning	(0008,0104)	LO	universal
Presentation Label	(0070,0080)	CS	universal
Presentation Description	(0070,0081)	LO	universal
Presentation Creation Date	(0070,0082)	DA	universal
Presentation Creation Time	(0070,0083)	TM	universal
Presentation Creator's Name	(0070,0084)	PN	universal
Referenced Series Sequence	(0008,1115)	SQ	universal
>Series Instance UID	(0020,000E)	UI	universal
>Referenced Image Sequence	(0008,1140)	SQ	universal
>>Referenced SOP Class UID	(0008,1150)	UI	universal
>>Referenced SOP Instance UID	(0008,1155)	UI	universal

Table 59: PATIENT ROOT C-FIND SCP SUPPORTED ELEMENTS

Level Name Attribute Name	Tag	VR	Types of Matching
Study Level			
Patient‘s Name	(0010,0010)	PN	single value, wild card, universal
Patient ID	(0010,0020)	LO	single value, wild card, universal

Patient´s Birth Date	(0010,0030)	DA	single value, range, universal
Patient´s Sex	(0010,0040)	CS	single value, wild card, universal
Patient Comments	(0010,4000)	LT	single value, wild card, universal
Number of Patient Related Studies	(0020,1200)	IS	universal
Number of Patient Related Series	(0020,1202)	IS	universal
Number of Patient Related Instances (Number of Patient Related Images)	(0020,1204)	IS	universal
Study Instance UID	(0020,000D)	UI	single value, universal
Study ID	(0020,0010)	SH	single value, wild card, universal
Study Date	(0008,0020)	DA	single value, range, universal
Study Time	(0008,0030)	TM	single value, range, universal
Accession Number	(0008,0050)	SH	single value, wild card, universal
Referring Physician's Name	(0008,0090)	PN	single value, wild card, universal
Modalities in Study	(0008,0061)	CS	single value, wild card, universal
Study Description	(0008,1030)	LO	single value, wild card, universal
Study Comments	(0032,4000)	LT	single value, wild card, universal
Name of Physician(s) Reading Study	(0008,1060)	PN	single value, wild card, universal
Number of Study Related Series	(0020,1206)	IS	universal
Number of Study Related Instances (Number of Study Related Images)	(0020,1208)	IS	universal
Series Level			
Series Instance UID	(0020,000E)	UI	single value, universal
Series Number	(0020,0011)	IS	single value, wild card, universal
Modality	(0008,0060)	CS	single value, wild card, universal
Series Date	(0008,0021)	DA	single value, range, universal
Series Time	(0008,0031)	TM	single value, range, universal
Series Description	(0008,103E)	LO	single value, wild card, universal
Performing Physician's Name	(0008,1050)	PN	single value, wild card, universal
Body Part Examined	(0018,0015)	CS	single value, wild card, universal
Manufacturer	(0008,0070)	LO	single value, wild card, universal
Request Attribute Sequence	(0040,0275)	SQ	universal
>Requested Procedure ID	(0040,1001)	SH	single value, wild card, universal
>Scheduled Procedure Step ID	(0040,0009)	SH	single value, wild card, universal
Performed Procedure Step Start Date	(0040,0244)	DA	single value, range, universal
Performed Procedure Step Start Time	(0040,0245)	TM	single value, range, universal
Number of Series Related Instances (Number of Series Related Images)	(0020,1209)	IS	universal
Image Level			
SOP Instance UID	(0008,0018)	UI	single value, universal
SOP Class UID	(0008,0016)	UI	single value, universal
Content Date (Image Date)	(0008,0023)	DA	single value, range, universal
Content Time (Image Time)	(0008,0033)	TM	single value, range, universal
Instance Number (Image Number)	(0020,0013)	IS	single value, wild card, universal
Number of Frames	(0028,0008)	IS	single value, wild card, universal
Rows	(0028,0010)	US	single value, wild card, universal
Columns	(0028,0011)	US	single value, wild card, universal
Bits Allocated	(0028,0100)	US	single value, wild card, universal
Referenced Request Sequence	(0040,A370)	SQ	universal
>Study Instance UID	(0020,000D)	UI	universal
>Accession Number	(0008,0050)	SH	universal
>Requested Procedure ID	(0040,1001)	SH	universal
>Requested Procedure Code Sequence	(0032,1064)	SQ	universal
>>Code Value	(0008,0100)	SH	universal
>>Coding Scheme Designator	(0008,0102)	SH	universal
>>Coding Scheme Version	(0008,0103)	SH	universal
>>Code Meaning	(0008,0104)	LO	universal
Content Template Sequence	(0040,A504)	SQ	universal

>Template Identifier	(0040,DB00)	CS	universal
Concept Name Code Sequence	(0040,A043)	SQ	universal
>Code Value	(0008,0100)	SH	universal
>Coding Scheme Designator	(0008,0102)	SH	universal
>Coding Scheme Version	(0008,0103)	SH	universal
>Code Meaning	(0008,0104)	LO	universal
Presentation Label	(0070,0080)	CS	universal
Presentation Description	(0070,0081)	LO	universal
Presentation Creation Date	(0070,0082)	DA	universal
Presentation Creation Time	(0070,0083)	TM	universal
Presentation Creator's Name	(0070,0084)	PN	universal
Referenced Series Sequence	(0008,1115)	SQ	universal
>Series Instance UID	(0020,000E)	UI	universal
>Referenced Image Sequence	(0008,1140)	SQ	universal
>>Referenced SOP Class UID	(0008,1150)	UI	universal
>>Referenced SOP Instance UID	(0008,1155)	UI	universal

Table 60: STUDY ROOT C-FIND SCP SUPPORTED ELEMENTS

Level Name Attribute Name	Tag	VR	Types of Matching
Patient Level			
Patient's Name	(0010,0010)	PN	single value, wild card, universal
Patient ID	(0010,0020)	LO	single value, wild card, universal
Patient´s Birth Date	(0010,0030)	DA	single value, range, universal
Patient´s Sex	(0010,0040)	CS	single value, wild card, universal
Patient Comments	(0010,4000)	LT	single value, wild card, universal
Number of Patient Related Studies	(0020,1200)	IS	universal
Number of Patient Related Series	(0020,1202)	IS	universal
Number of Patient Related Instances (Number of Patient Related Images)	(0020,1204)	IS	universal
Study Level			
Study Instance UID	(0020,000D)	UI	single value, universal
Study ID	(0020,0010)	SH	single value, wild card, universal
Study Date	(0008,0020)	DA	single value, range, universal
Study Time	(0008,0030)	TM	single value, range, universal
Accession Number	(0008,0050)	SH	single value, wild card, universal
Referring Physician's Name	(0008,0090)	PN	single value, wild card, universal
Modalities in Study	(0008,0061)	CS	single value, wild card, universal
Study Description	(0008,1030)	LO	single value, wild card, universal
Study Comments	(0032,4000)	LT	single value, wild card, universal
Name of Physician(s) Reading Study	(0008,1060)	PN	single value, wild card, universal
Number of Study Related Series	(0020,1206)	IS	universal
Number of Study Related Instances (Number of Study Related Images)	(0020,1208)	IS	universal

Table 61: PATIENT/STUDY ONLY ROOT C-FIND SCP SUPPORTED ELEMENTS

The QUERY-RETRIEVE-SCP AE will return the Status Code values in C-FIND Responses as shown in the following table.

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	Matching is complete. No final identifier is supplied.

Failed	Identifier does not match SOP Class	0xA900	The C-FIND query identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class. Error message is stored in the Trace Database.
	Unable to process	0xC001	An internal processing error occurred which makes further processing of the query request impossible. Error message is stored in the Trace Database.
Pending	Matches are continuing and current match is supplied	0xFF00	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.

Table 62: QUERY-RETRIEVE-SCP AE C-FIND RESPONSE STATUS RETURN BEHAVIOR

4.2.6.4.1.5 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 C-MOVE SCU (through a MOVE Destination AE Title) should be established. It will also convey to the STORAGE-SCU AE to perform C-STORE operations on specific instances requested by the external C-MOVE SCU. One or more of the Image Storage Presentation Contexts listed in Table 8 will be negotiated.

An initial C-MOVE Response is always sent after confirming that the C-MOVE Request itself can be processed. After this, the QUERY-RETRIEVE-SCP AE will return a response to the C-MOVE SCU after the STORAGE-SCU AE has attempted to send each image. This response reports contain the number of remaining SOP Instances to transfer and the number of transfers having a successful, failed, or warning status.

Note: A C-MOVE Request is refused by Visage 7 with status 0xA702 if the required SOP Instances are locked for a scheduled Patient Information Reconciliation (PIR) process.

The QUERY-RETRIEVE-SCP AE will return the Status Code values in C-MOVE Responses as shown in the following table.

Service Status	Further Meaning	Error Code	Behavior
Success	Sub-operations complete – No Failures	0x0000	All the Composite SOP Instances have been successfully sent to the C-MOVE Destination AE.
Warning	Sub-operations complete – One or more Failures	0xB000	Some of the Composite SOP Instances have been successfully sent to the C-MOVE Destination AE. A list with all the failed SOP Instance UIDs is sent along with the response message (Tag 0008,0058).
Refused	Out of Resources – Unable to calculate number of matches	0xA701	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 indication message is stored in the Trace Database. No message is posted to the User Interface.
	Refused: Out of Resources – Unable to perform	0xA702	C-STORE sub-operations cannot be performed due to failure to access Composite SOP Instances, or failure of a C-STORE Request. For example, this Status will be returned if the required SOP Instances are deleted in the meantime or the affected patient is locked for PIR process. Error indication message is stored in the Trace Database.

	sub-operations		No message is posted to the User Interface.
	Move destination unknown	0xA801	The Destination Application Entity named in the C-MOVE Request is unknown to Query-Retrieve SCP AE. Error indication message is stored in the Trace Database. No message is posted to the User Interface.
Failed	Data set does not match SOP Class	0xA900	The C-MOVE identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class or retrieval level. Error message is stored in the Trace Database. No message is posted to the User Interface.
	Unable to process	0xC001	An internal processing error occurred which makes further processing of the retrieve request impossible. Error message is stored in the Trace Database. No message is posted to the User Interface.
Pending	Sub-operations are continuing	0xFF00	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 63: QUERY-RETRIEVE-SCP AE C-MOVE RESPONSE STATUS RETURN BEHAVIOR

The behavior of QUERY-RETRIEVE-SCP AE during communication failure is summarized in the following table:

Exception	Behavior
Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. The QUERY-RETRIEVE-SCP AE is waiting for the next C-FIND or C-MOVE Request on an open Association but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error message is stored in the Trace Database. If the STORAGE-SCU AE is still sending 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. Error message is stored in the Trace Database. If the STORAGE-SCU AE is still sending 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 A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	Error message is stored in the Trace Database. If the STORAGE-SCU AE is still sending 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.

Table 64: QUERY-RETRIEVE-SCP AE COMMUNICATION FAILURE BEHAVIOR

4.2.7 QUERY-RETRIEVE-SCP Application Entity (Level B) Specification

Visage 7 stores received DICOM objects in two different compression levels specified as Level A and Level B. The compression type can be configured for each level via administration interface. If Visage 7 Archive is present the DICOM objects are additionally stored with the original or lossless compressed format (configurable) in the Archive Level. The Query/Retrieve-SCU AE decides which Level is accessed for Query and Retrieve requests by using the appropriate AE Title that is assigned to each Level.

The difference between Level A and Level B is only the configured compression type so the DICOM behaviour of QUERY-RETRIEVE-SCP AE (Level B) is identical to QUERY-RETRIEVE-SCP AE which represents the compression Level A. See chapter 4.2.6 for the description of the Level B QUERY-RETRIEVE-SCP AE.

4.2.8 QUERY-RETRIEVE-SCP Application Entity (Archive Level) Specification

Visage 7 stores received DICOM objects in two different compression levels specified as Level A and Level B. The compression type can be configured for each level via administration interface. If Visage 7 Archive is present the DICOM objects are additionally stored with the original or lossless compressed format (configurable) in the Archive Level. The Query/Retrieve-SCU AE decides which Level is accessed for Query and Retrieve requests by using the appropriate AE Title that is assigned to each Level.

The difference between the Archive Level and Level A/Level B is only the location of the stored DICOM objects and the fact that the objects are always present in either the original or the lossless compressed format. So the DICOM behaviour of QUERY-RETRIEVE-SCP AE (Archive Level) is identical to QUERY-RETRIEVE-SCP AE which represents the compression Level A. See chapter 4.2.6 for the description of the Archvie Level QUERY-RETRIEVE-SCP AE.

4.2.9 MODALITY-WORKLIST-SCP Application Entity Specification

Visage 7 makes DICOM Modality Worklist Query functionality available to Radiology Information Systems with no own DICOM Interface. The Scheduled Procedure Step information is read from the RIS database which is configured via administration interface.

4.2.9.1 SOP Classes

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

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	No	Yes
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	No	Yes

Table 65: SOP CLASSES FOR MODALITY-WORKLIST-SCP AE

4.2.9.2 Association Establishment Policies

4.2.9.2.1 General

The MODALITY-WORKLIST-SCP AE will never initiate Associations; it only accepts Association Requests from external DICOM Aes. The MODALITY-WORKLIST-SCP AE will accept Associations for Verification and C-FIND requests.
The DICOM standard Application Context Name for DICOM 3.0 is always accepted:

Application Context Name	1.2.840.10008.3.1.1.1

Table 66: DICOM APPLICATION CONTEXT FOR MODALITY-WORKLIST-SCP AE

4.2.9.2.2 Number of Associations

The MODALITY-WORKLIST-SCP AE can support multiple simultaneous Associations. Each time the MODALITY-WORKLIST-SCP AE receives an Association, a child process will be spawned to process the Verification or MWL request. The maximum number of child processes, and thus the maximum number of simultaneous Associations that can be processed, is set by configuration. The maximum is limited by the License Key.

Maximum number of simultaneous Associations	- Limited by License Key - Restrictable by administrator

Table 67: NUMBER OF ASSOCIATIONS AS A SCP FOR MODALITY-WORKLIST-SCP AE

4.2.9.2.3 Asynchronous Nature

The MODALITY-WORKLIST-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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 68: ASYNCHRONOUS NATURE AS A SCP FOR MODALITY-WORKLIST-SCP AE

4.2.9.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 69: DICOM IMPLEMENTATION CLASS AND VERSION FOR MODALITY-WORKLIST-SCP AE

4.2.9.3 Association Initiation Policy

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

4.2.9.4 Association Acceptance Policy

4.2.9.4.1 Activity – Handling Query Requests

4.2.9.4.1.1 Description and Sequencing of Activity

The MODALITY-WORKLIST-SCP AE accepts Associations only if they have valid Presentation Contexts. If none of requested Presentation Contexts are accepted then the Association Request itself is rejected. Only associations with Application Entity Titles of DICOM partner nodes will be accepted that are configured on the administration interface. If MODALITY-WORKLIST-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.

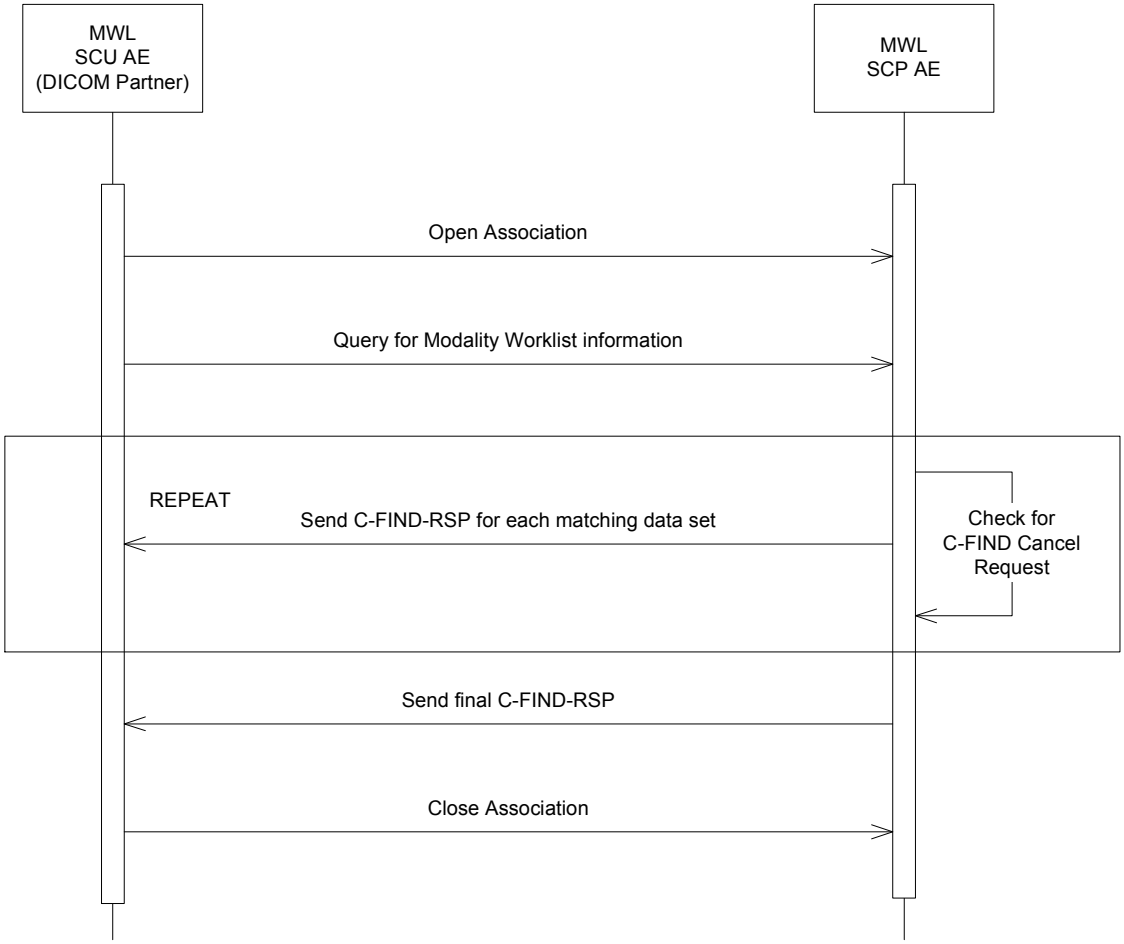

Figure 12: SEQUENCING OF ACTIVITY – HANDLING MODALITY WORKLIST QUERY REQUESTS

The following sequencing constraints illustrated in Figure 12 apply to the MODALITY-WORKLIST-SCP AE for handling Modality Worklist queries (C-FIND-Requests):

1. Partner AE opens an Association with the MODALITY-WORKLIST-SCP AE.
2. Partner AE sends a C-FIND-RQ Message.
3. MODALITY-WORKLIST-SCP AE returns a C-FIND-RSP Message to the Partner AE with matching information. A C-FIND-RSP is sent for each entity matching the identifier specified in the C-FIND-RQ. MODALITY-WORKLIST-SCP AE checks for a C-FIND Cancel Request after each sent Pending response message. If a Cancel is received then no further Pending responses are sent. A final C-FIND-RSP is sent indicating that the matching is complete or the query was canceled.
4. Partner AE closes the Association. Note that the Partner AE does not have to close the Association immediately. Further C-FIND Requests can be sent over the Association before it is closed.

The MODALITY-WORKLIST-SCP AE may reject Association attempts as shown in Table 70. 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:

d. 1 – DICOM UL service-user
e. 2 – DICOM UL service-provider (ASCE related function)
f. 3 – DICOM UL service-provider (Presentation related function)

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
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. If the Promiscuous Mode is switched on the Association request is accepted and then aborted instead.
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.

Table 70: ASSOCIATION REJECTION REASONS

4.2.9.4.1.2 Accepted Presentation Contexts

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

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 Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None

Table 71: ACCEPTED PRESENTATION CONTEXTS BY THE QUERY-RETRIEVE-SCP AE

4.2.9.4.1.3 SOP Specific Conformance for Verification SOP Class

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

4.2.9.4.1.4 SOP Specific Conformance for Modality Worklist SOP Class

The MODALITY-WORKLIST-SCP AE is able to handle all Attributes which are defined by the DICOM Standard for the Modality Worklist information model. The data elements provided by Visage 7 depend on the information that is available in the RIS database. The Visage 7 / RIS adaption has to be done by specifying the supported attributes in the Visage 7 database at installation time.

By default the MODALITY-WORKLIST-SCP AE does not support matching on any optional matching key attribute but this can be changed by modifying the settings in the Visage 7 database.

The matching behaviors of the attributes of the Modality Worklist information model are listed in the following table.

Attribute Name	Tag	VR	Types of Matching
Scheduled Procedure Step Sequence	(0040,0100)	SQ	-
>Scheduled Station AE Title	(0040,0001)	AE	single value, universal
>Scheduled Procedure Step Start Date	(0040,0002)	DA	single value, range, universal
>Scheduled Procedure Step Start Time	(0040,0003)	TM	single value, range, universal
>Modality	(0008,0060)	CS	single value, wildcard, universal
>Scheduled Performing Physician's Name	(0040,0006)	PN	single value, wildcard, universal
Patient's Name	(0010,0010)	PN	single value, wildcard, universal
Patient ID	(0010,0020)	LO	single value, wildcard, universal
All other Attributes of the Modality Worklist Information Model	-	-	universal

Table 72: MODALITY WORKLIST MATCHING ATTRIBUTE BEHAVIOR

Mapping of Attributes

The MODALITY-WORKLIST-SCP AE can map attribute values contained in the worklist request and response messages. This mechanism is primarily provided to eliminate inconsistency between the examination descriptions used by the RIS and the Modalities. The administrator can specify a set of description mappings for each configured MODALITY-WORKLIST-SCU AE on the administration interface. By default the attribute mapping is performed for the DICOM attribute 'Scheduled Procedure Step Description' (Tag 0040,0007) but it is possible to change or extend the affected attribute data set.

Mapping of Scheduled Station AE Title / Alias Name

It is assumed that the RIS uses the Alias Name specified in Visage 7 in place of the AE Title to identify the Scheduled Station. Therefore the attribute 'Scheduled Station AE Title' is mapped to the Alias Name by the MODALITY-WORKLIST-SCP AE automatically when a worklist query request is received. This mapping is also performed when filling up pending response messages with the return values.

The MODALITY-WORKLIST-SCP AE will return the Status Code values in C-FIND Responses as shown in the following table.

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	Matching is complete. No final identifier is supplied.
Failed	Identifier does not match SOP Class	0xA900	The C-FIND query identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class. Error message is stored in the Trace Database.
	Unable to process	0xC001	An internal processing error occurred which makes further processing of the query request impossible. Error message is stored in the Trace Database.
Canceled	Matching derminated due to cancel request	0xFE00	This status is returned if a Cancel Request is received from the SCU during the processing of a Modality Worklist request.
Pending	Matches are continuing - Current match is supplied	0xFF00	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.
	Matching is continuing - Current match is supplied and any optional keys were supported in the same matter as required keys	0xFF01	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 one or more optional matching or return keys are not supported for existence.

Table 73: MODALITY-WORKLIST-SCP AE C-FIND RESPONSE STATUS RETURN BEHAVIOR

The behavior of MODALITY-WORKLIST-SCP AE during communication failure is summarized in the following table:

Exception	Behavior
Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. The MODALITY-WORKLIST-SCP AE is waiting for the next C-FIND Request on an open Association but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error message is stored in the Trace Database.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout). I.e. The MODALITY-WORKLIST-SCP AE is waiting for the next message PDU but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error message is stored in the Trace Database.
Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	Error message is stored in the Trace Database.

Table 74: MODALITY-WORKLIST-SCP AE COMMUNICATION FAILURE BEHAVIOR

4.2.10 PPS-SCP Application Entity Specification

Visage 7 makes DICOM Modality Performed Procedure Step functionality available to Radiology Information Systems with no own DICOM Interface. The Performed Procedure Step status information is written to the RIS database which is configured via administration interface and the Performed Procedure Step status is analyzed for discarding mistakenly produced SOP Instances received by Visage 7. Additionally incoming GP-PPS and MPPS messages are forwarded to the PPS-SCU AE in order to transfer them to configured DICOM Partner Aes.

4.2.10.1 SOP Classes

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

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	No	Yes
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	No	Yes
General Purpose Performed Procedure Step	1.2.840.10008.5.1.4.32.3	No	Yes

Table 75: SOP CLASSES FOR PPS-SCP AE

4.2.10.2 Association Establishment Policies

4.2.10.2.1 General

The PPS-SCP AE will never initiate Associations; it only accepts Association Requests from external DICOM Aes. The PPS-SCP AE will accept Associations for Verification, GP-PPS/MPPS N-CREATE and N-SET requests.
The DICOM standard Application Context Name for DICOM 3.0 is always accepted:

Application Context Name	1.2.840.10008.3.1.1.1

Table 76: DICOM APPLICATION CONTEXT FOR PPS-SCP AE

4.2.10.2.2 Number of Associations

The PPS-SCP AE can support multiple simultaneous Associations. Each time the PPS-SCP AE receives an Association, a child process will be spawned to process the Verification or GP-PPS/MPPS request. The maximum number of child processes, and thus the maximum number of simultaneous Associations that can be processed, is set by configuration. The maximum is limited by the License Key.

Maximum number of simultaneous Associations	- Limited by License Key - Restrictable by administrator

Table 77: NUMBER OF ASSOCIATIONS AS A SCP FOR PPS-SCP AE

4.2.10.2.3 Asynchronous Nature

The PPS-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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 78: ASYNCHRONOUS NATURE AS A SCP FOR PPS-SCP AE

4.2.10.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 79: DICOM IMPLEMENTATION CLASS AND VERSION FOR PPS-SCP AE

4.2.10.3 Association Initiation Policy

The PPS-SCP AE does not initiate Associations.

4.2.10.4 Association Acceptance Policy

4.2.10.4.1 Activity – Handling PPS Requests

4.2.10.4.1.1 Description and Sequencing of Activity

The PPS-SCP AE accepts Associations only if they have valid Presentation Contexts. If none of requested Presentation Contexts are accepted then the Association Request itself is rejected. Only associations with Application Entity Titles of DICOM partner nodes will be accepted that are configured on the administration interface.

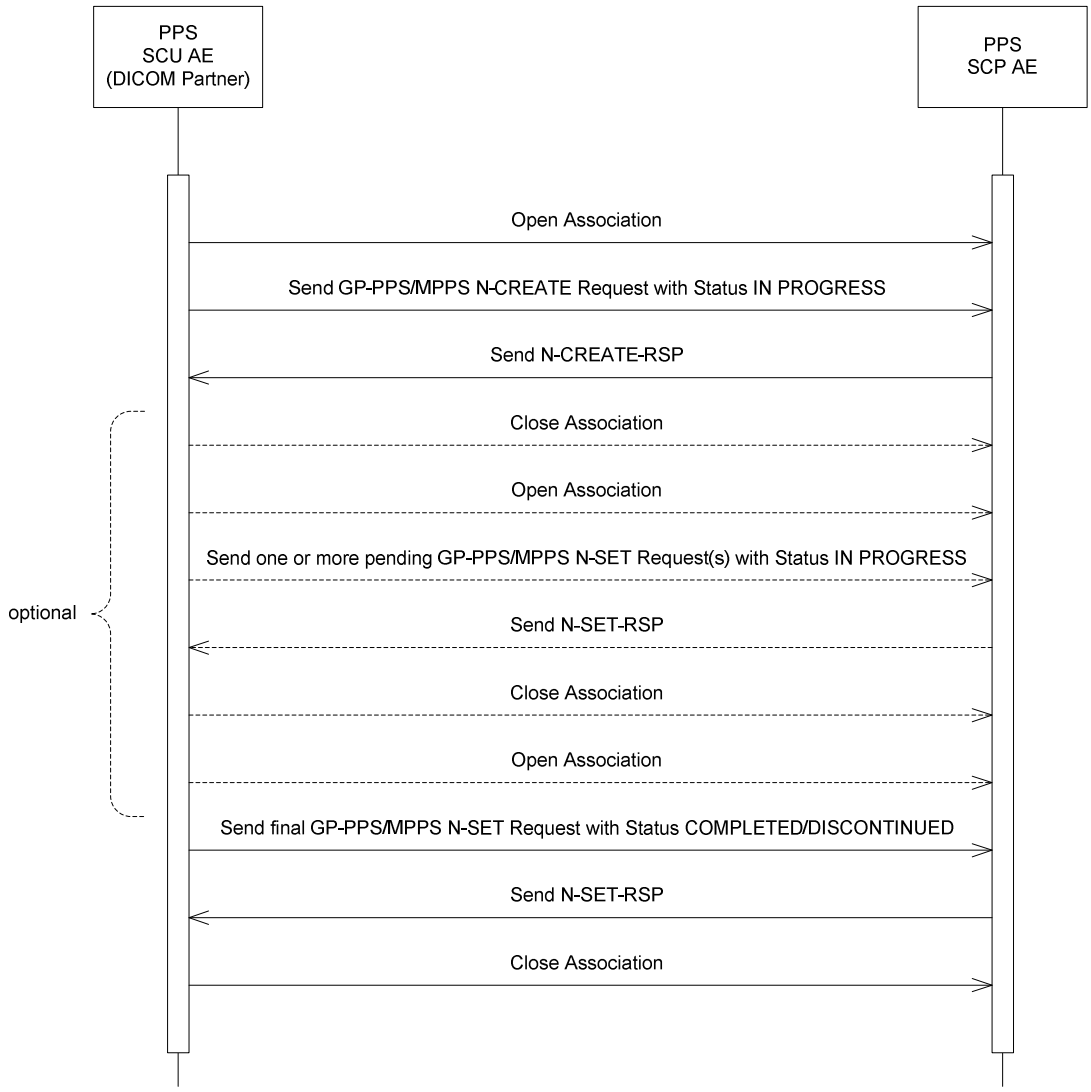

Figure 13: SEQUENCING OF ACTIVITY – HANDLING PPS REQUESTS

The following sequencing constraints illustrated in Figure 13 apply to the PPS-SCP AE for handling PPS Requests (N-CREATE-/N-SET-Requests):

1. Partner AE opens an Association with the PPS-SCP AE.
2. Partner AE sends a N-CREATE-RQ Message to signal that performing of one or more Requested Procedures has been started. PPS-SCP AE returns a N-CREATE-RSP Message to indicate the reception of the request.
3. Partner AE sends one or more N-SET-RQ Message to signal the intermediate status of the performed Requested Procedures. PPS-SCP AE returns a N-SET-RSP Message to indicate the reception of the request.
4. Partner AE sends a final N-SET-RQ Message to signal that performing the Requested Procedures has been finished. PPS-SCP AE returns a N-SET-RSP Message to indicate the reception of the request.
5. Partner AE closes the Association. Note that the Partner AE does not have to send all GP-PPS/MPPS Messages over the same Association. For each N-CREATE-/N-SET-RQ Message an own Association can be established.

The PPS-SCP AE may reject Association attempts as shown in Table 80. 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:

g. 1 – DICOM UL service-user
h. 2 – DICOM UL service-provider (ASCE related function)
i. 3 – DICOM UL service-provider (Presentation related function)

Result	Source	Reason/Diag	Explanation
2 – rejected-transient	c	2 – local-limit-exceeded	The (configurable) maximum number of simultaneous Associations has been reached. An Association request with the same parameters may succeed at a later time.
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. If the Promiscuous Mode is switched on the Association request is accepted and then aborted instead.
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.

Table 80: ASSOCIATION REJECTION REASONS

4.2.10.4.1.2 Accepted Presentation Contexts

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

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 Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None
General Purpose Performed Procedure Step	1.2.840.10008.5.1.4.32.3	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCP	None

Table 81: ACCEPTED PRESENTATION CONTEXTS BY THE PPS-SCP AE

4.2.10.4.1.3 SOP Specific Conformance for Verification SOP Class

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

4.2.10.4.1.4 SOP Specific Conformance for MPPS SOP Class

DICOM Interface for Radiology Information Systems

The PPS-SCP AE is able to handle all Attributes which are defined by the DICOM Standard for the Modality Performed Procedure Step. The data elements processed by Visage 7 depend on the information that can be set in the RIS database. The Visage 7 / RIS adaption has to be done by specifying the supported attributes in the Visage 7 database at installation time.

Mapping of Attributes

The PPS-SCP AE can map attribute values contained in the worklist request and response messages. This mechanism is primarily provided to eliminate inconsistency between the examination descriptions used by the RIS and the Modalities. The administrator can specify a set of description mappings for each configured PPS-SCU AE on the administration interface. By default the attribute mapping is performed for the DICOM attribute ‘Performed Procedure Step Description’ (Tag 0040,0254) but it is possible to change or extend the affected attribute data set.

Mapping of Performed Station AE Title / Alias Name

It is assumed that the RIS uses the Alias Name specified in Visage 7 in place of the AE Title to identify the Performed Station. Therefore the attribute ‘Performed Station AE Title’ is mapped to the Alias Name by the PPS-SCP AE automatically when a MPPS request is received.

Procedure Step Status Analysis

If the Performed Procedure Step Status (0040,0252) provided with a received N-SET Request Message is set to DISCONTINUED and the Discontinuation Reason Code (0008,0100) is ‘Incorrect Worklist Entry Selected’ (Code Value = 110514) all SOP Instances that are received for this Performed Procedure Step will be discarded to ensure that these objects are not mistakenly used. This also affects SOP Instances that arrive later on.

The PPS-SCP AE will return the Status Code values in N-CREATE/N-SET Responses as shown in the following table.

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	Matching is complete. No final identifier is supplied.
Error	Missing attribute value	0x0121	A required Attribute was not supplied with the MPPS request message. Error message is stored in the Trace Database.
	Invalid attribute value	0x0106	The Attribute Value specified was out of range or otherwise inappropriate. Error message is stored in the Trace Database.
	Unable to process	0x0110	An internal processing error occurred which makes further processing of the query request impossible. Error message is stored in the Trace Database.

Table 82: PPS-SCP AE MPPS N-CREATE/N-SET RESPONSE STATUS RETURN BEHAVIOR

The behavior of PPS-SCP AE during communication failure is summarized in the following table:

Exception	Behavior
Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. The PPS-SCP AE is waiting for the next N-CREATE/N-SET Request on an open Association but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error message is stored in the Trace Database.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout). I.e. The PPS-SCP AE is waiting for the next message PDU but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error message is stored in the Trace Database.
Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	Error message is stored in the Trace Database.

Table 83: PPS-SCP AE MPPS COMMUNICATION FAILURE BEHAVIOR

4.2.10.4.1.5 SOP Specific Conformance for GP-PPS SOP Class

The PPS-SCP AE will return the Status Code values in N-CREATE/N-SET Responses as shown in the following table.

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0x0000	Matching is complete. No final identifier is supplied.
Error	Missing attribute value	0x0121	A required Attribute was not supplied with the GP-PPS request message. Error message is stored in the Trace Database.
	Invalid attribute value	0x0106	The Attribute Value specified was out of range or otherwise inappropriate. Error message is stored in the Trace Database.
	Unable to process	0x0110	An internal processing error occurred which makes further processing of the query request impossible. Error message is stored in the Trace Database.

Table 84: PPS-SCP AE N-CREATE/N-SET RESPONSE STATUS RETURN BEHAVIOR

The behavior of PPS-SCP AE during communication failure is summarized in the following table:

Exception	Behavior
Timeout expiry for an expected DICOM Message Request (DIMSE level timeout). I.e. The PPS-SCP AE is waiting for the next N-CREATE/N-SET Request on an open Association but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error message is stored in the Trace Database.
Timeout expiry for an expected DICOM PDU or TCP/IP packet (Low-level timeout). I.e. The PPS-SCP AE is waiting for the next message PDU but the timer expires.	The Association is aborted by issuing a DICOM A-ABORT. Error message is stored in the Trace Database.
Association A-ABORTed by the SCU or the network layers indicate communication loss (i.e. low-level TCP/IP socket closure)	Error message is stored in the Trace Database.

Table 85: PPS-SCP AE COMMUNICATION FAILURE BEHAVIOR

4.2.11 PPS-SCU Application Entity Specification

Visage 7 provides a mechanism to forward incoming GP-PPS and MPPS messages to configured DICOM Partner Aes. The forwarding rules can be defined via administration interface.

4.2.11.1 SOP Classes

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

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No
General Purpose Performed Procedure Step	1.2.840.10008.5.1.4.32.3	Yes	No

Table 86: SOP CLASSES FOR PPS-SCU AE

4.2.11.2 Association Establishment Policies

4.2.11.2.1 General

The PPS-SCU AE can only form Associations when requested to do so by the PPS-SCP AE. The PPS-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:

Application Context Name	1.2.840.10008.3.1.1.1

Table 87: DICOM APPLICATION CONTEXT FOR PPS-SCU AE

4.2.11.2.2 Number of Associations

For each PPS request one association to the PPS Destination AE is established by the PPS-SCU AE. PPS requests initiated by the PPS-SCP AE will be stored in a job queue and up to 14 PPS jobs can be performed simultaneously (8 high prior jobs, 4 medium prior jobs and 2 low prior jobs).

Maximum number of simultaneous Associations	Up to 14 (Not Configurable)

Table 88: NUMBER OF ASSOCIATIONS AS A SCU FOR PPS-SCU AE

4.2.11.2.3 Asynchronous Nature

The PPS-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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 89: ASYNCHRONOUS NATURE AS A SCU FOR PPS-SCU AE

4.2.11.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 90: DICOM IMPLEMENTATION CLASS AND VERSION FOR PPS-SCU AE

4.2.11.3 Association Initiation Policy

4.2.11.3.1 Activity – Send PPS Requests to an External Peer AE

4.2.11.3.1.1 Description and Sequencing of Activity

The PPS-SCU AE will initiate a new Association when the PPS-SCP AE invokes the PPS-SCU AE to transmit GP-PPS/MPPS messages. The PPS-SCP AE will issue such a command whenever an appropriate rule requests the forwarding of GP-PPS/MPPS messages to Partner Aes. An Association Request is sent to the specified PPS-SCP AE and upon successful negotiation of the required Presentation Context the message transfer is started. If there are multiple outstanding GP-PPS/MPPS messages to be sent to a single partner AE then the PPS-SCU AE will send them always over separate Associations. The Association will be released when the N-CREATE/N-SET message for the partner AE has been sent. If any type of error occurs during transmission (either a communication failure or indicated by a Status Code returned by the partner AE) over an open Association then the transfer of GP-PPS/MPPS messages is halted. A new Association will be opened to retry sending outstanding N-CREATE/N-SET messages. The maximum number of times the PPS-SCU AE will attempt to resend a PPS message is configurable, along with the amount of time to wait between attempts to resend.

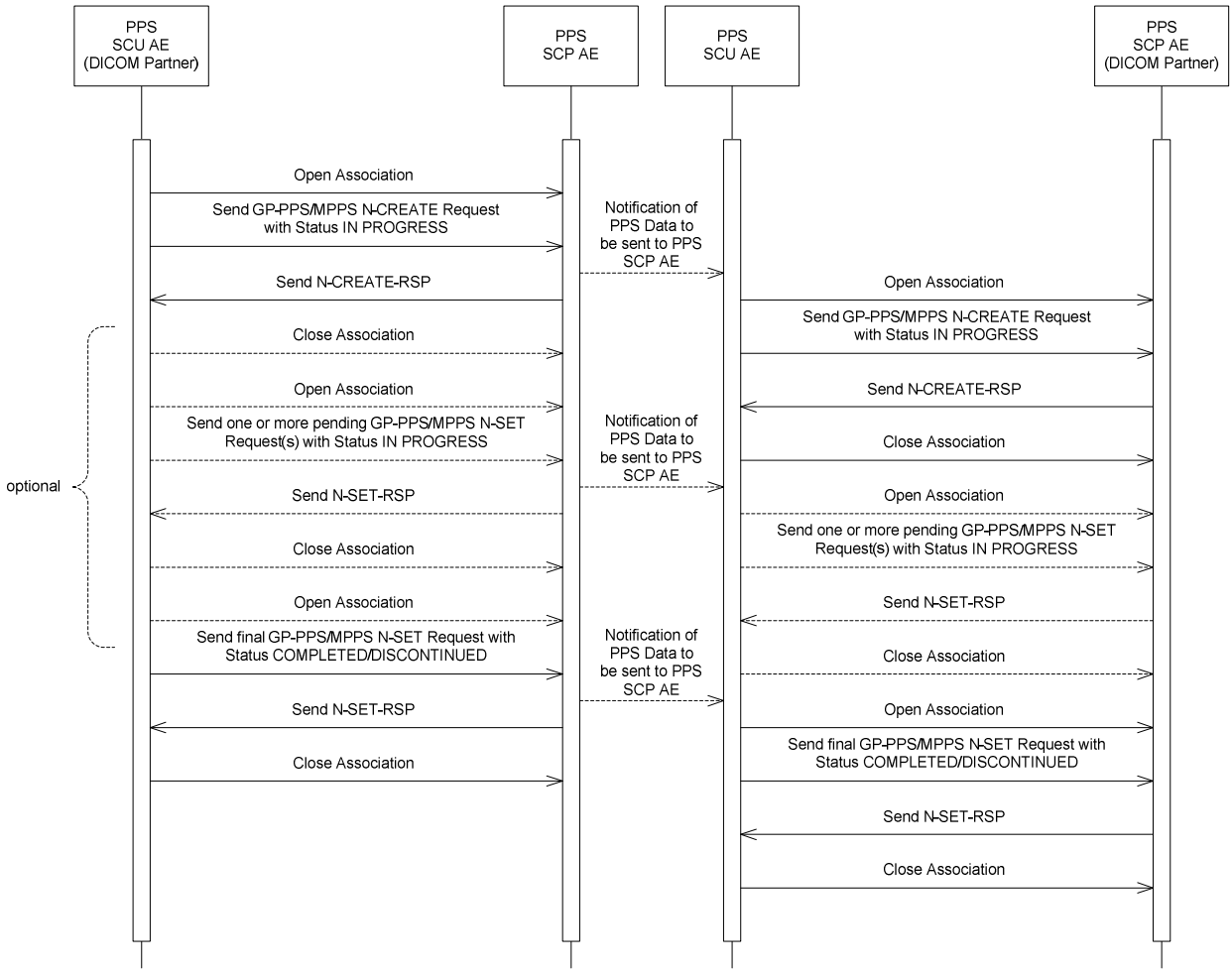

Figure 14: SEQUENCING OF ACTIVITY – SEND PPS REQUESTS

The following sequencing constraints illustrated in Figure 14 apply to the PPS-SCU AE for sending PPS Requests (N-CREATE-/N-SET-Requests):

1. Partner AE opens an Association with the PPS-SCP AE.
2. Partner AE sends a GP-PPS/MPPS N-CREATE-RQ Message
3. Partner AE sends one or more GP-PPS/MPPS N-SET-RQ Messages
4. Partner AE closes the Association. Note that the Partner AE have not to send all GP-PPS/MPPS Messages over the same Association. For each N-CREATE-/N-SET-RQ Message an own Association can be established.
5. PPS-SCP AE signals PPS-SCU AE for each received PPS Message to forward it to the Partner Aes configured as PPS Message forwarding destinations.
6. PPS-SCU AE opens a new association with the specified destination AE.
7. PPS-SCU AE sends the N-CREATE- or N-SET-RQ Message.
8. Partner AE returns a N-CREATE- or N-SET-RSP Message to the PPS-SCU AE.
9. PPS-SCU AE closes the association. Note that the PPS-SCP AE creates an own Association for each PPS Message even if multiple outstanding GP-PPS/MPPS messages have to be sent to a single partner AE.
10. The send request is repeated a configurable number of times if transfer of GP-PPS/MPPS Messages failed.
11. The Verification Service is only supported as a utility function for Service staff. It is used only as a diagnostic tool.

4.2.11.3.1.2 Proposed Presentation Contexts

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

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 Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
General Purpose Performed Procedure Step	1.2.840.10008.5.1.4.32.3	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

Table 91: PROPOSED PRESENTATION CONTEXTS BY THE PPS-SCU AE

4.2.11.3.1.3 SOP Specific Conformance for Verification SOP Class

The PPS-SCU AE provides standard conformance to the Verification SOP Class as an SCU. The Verification Service as an SCU is actually only supported as a diagnostic service tool for network communication issues.

4.2.11.3.1.4 SOP Specific Conformance for MPPS SOP Class

When the PPS-SCU AE forwads MPPS Messages to the Partner Aes the content of the Message will be sent as it was originally received.

4.2.11.3.1.5 SOP Specific Conformance for GP-PPS SOP Class

When the PPS-SCU AE forwads GP-PPS Messages to the Partner Aes the content of the Message will be sent as it was originally received.

4.2.11.4 Association Acceptance Policy

The PPS-SCU AE does not accept Associations.

4.2.12 Instance Availability Notification-SCU Application Entity Specification

Visage 7 sends Instance Availability Notification messages to configured DICOM Partner Aes to inform them of the availability status of newly stored DICOM objects.

4.2.12.1 SOP Classes

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

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Instance Availability Notification	1.2.840.10008.5.1.4.33	Yes	No

Table 92: SOP CLASSES FOR INSTANCE AVAILABILITY NOTIFICATION-SCU AE

4.2.12.2 Association Establishment Policies

4.2.12.2.1 General

The INSTANCE AVAILABILITY NOTIFICATION-SCU AE can only form Associations when requested to do so by the STORAGE-SCP AE. The INSTANCE AVAILABILITY NOTIFICATION-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:

Application Context Name	1.2.840.10008.3.1.1.1

Table 93: DICOM APPLICATION CONTEXT FOR INSTANCE AVAILABILITY NOTIFICATION-SCU AE

4.2.12.2.2 Number of Associations

For each Instance Availability Notification request one association to the Instance Availability Notification Destination AE is established by the INSTANCE AVAILABILITY NOTIFICATION-SCU AE. Instance Availability Notification requests initiated by the STORAGE-SCP AE will be stored in a job queue and up to 14 PPS jobs can be performed simultaneously (8 high prior jobs, 4 medium prior jobs and 2 low prior jobs).

Maximum number of simultaneous Associations	Up to 14 (Not Configurable)

Table 94: NUMBER OF ASSOCIATIONS AS A SCU FOR INSTANCE AVAILABILITY NOTIFICATION-SCU AE

4.2.12.2.3 Asynchronous Nature

The INSTANCE AVAILABILITY NOTIFICATION-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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 95: ASYNCHRONOUS NATURE AS A SCU FOR INSTANCE AVAILABILITY NOTIFICATION-SCU AE

4.2.12.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 96: DICOM IMPLEMENTATION CLASS AND VERSION FOR INSTANCE AVAILABILITY NOTIFICATION-SCU AE

4.2.12.3 Association Initiation Policy

4.2.12.3.1 Activity – Send Instance Availability Notification Requests to an External Peer AE

4.2.12.3.1.1 Description and Sequencing of Activity

The INSTANCE AVAILABILITY NOTIFICATION-SCU will initiate a new Association once all images associated with a new study have been successfully received and stored into Visage 7 by the STORAGE-SCP AE. An Association Request is sent to all configured DICOM Partner Aes and upon successful negotiation of the required Presentation Context the message transfer is started. If there are multiple outstanding Instance Availability Notification messages to be sent to a single partner AE then the INSTANCE AVAILABILITY NOTIFICATION-SCU AE will send them always over separate Associations. The Association will be released when the N-CREATE request message has been sent and the partner AE has responded with a N-CREATE response message. If any type of error occurs during transmission (either a communication failure or indicated by a Status Code returned by the partner AE) over an open Association then the transfer of INSTANCE AVAILABILITY NOTIFICATION messages is halted. The INSTANCE AVAILABILITY NOTIFICATION-SCU AE will not attempt to independently retry the query request if an error occurs.

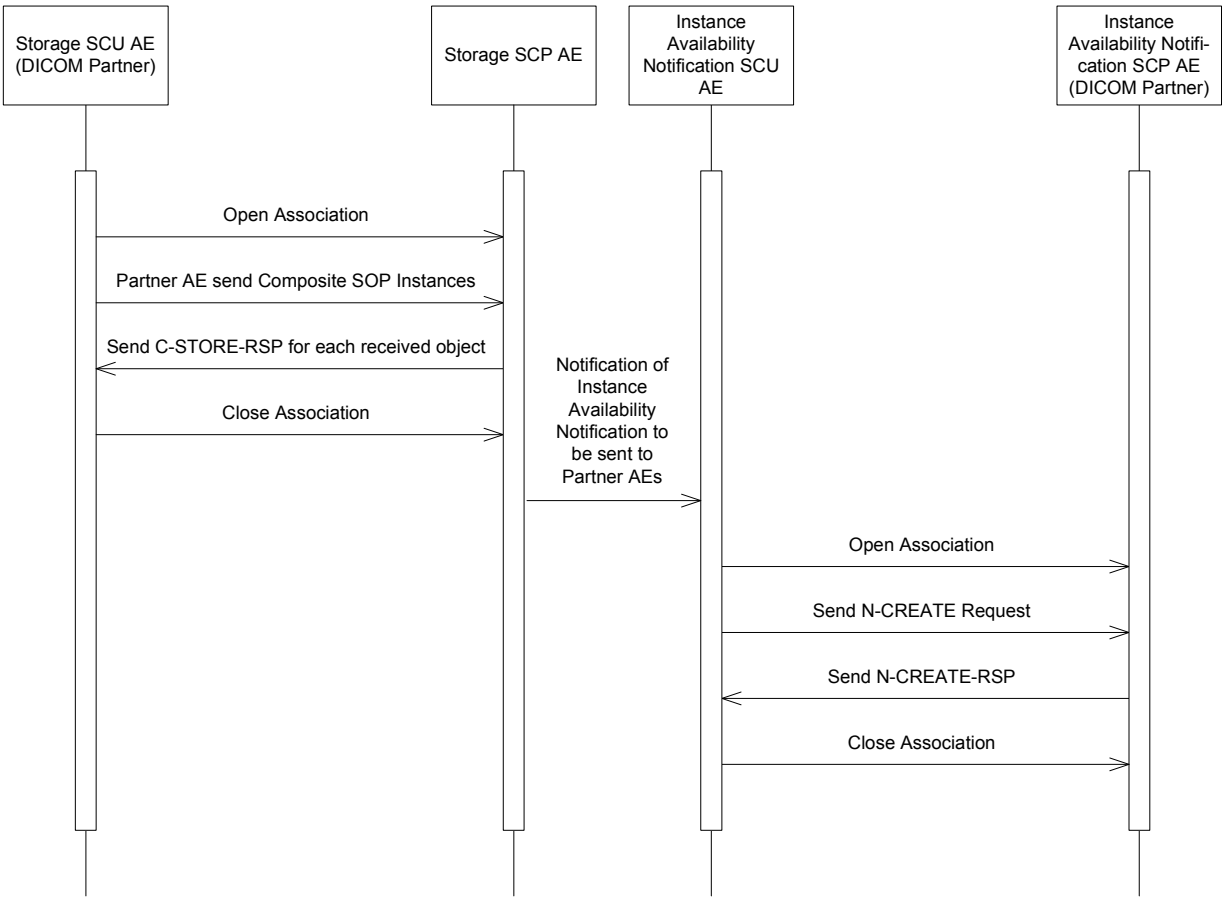

Figure 15: SEQUENCING OF ACTIVITY – SEND INSTANCE AVAILABILITY NOTIFICATION REQUESTS

The following sequencing constraints illustrated in Figure 15 apply to the INSTANCE AVAILABILITY NOTIFICATION-SCU AE for sending Instance Availability Notification Requests (N-CREATE-Requests):

1. Partner AE opens an Association with the STORAGE-SCP AE.
2. Partner AE sends one or more Composite SOP Instances.
3. STORAGE-SCP AE returns a C-STORE-RSP Message to the Partner AE with the storage status.
4. Partner AE closes the Association.
5. STORAGE-SCP AE signals INSTANCE AVAILABILITY NOTIFICATION-SCU AE that all images associated with a new study have been successfully received and stored into Visage 7.
6. INSTANCE AVAILABILITY NOTIFICATION-SCU AE opens a new association with the configured destination AE.
7. INSTANCE AVAILABILITY NOTIFICATION-SCU AE sends the N-CREATE-RQ Message.
8. Partner AE returns a N-CREATE-RSP Message to the INSTANCE AVAILABILITY NOTIFICATION-SCU AE.
9. INSTANCE AVAILABILITY NOTIFICATION-SCU AE closes the association. Note that the INSTANCE AVAILABILITY NOTIFICATION-SCU AE creates an own Association for each Instance Availability Notification Message even if multiple outstanding Instance Availability Notification messages have to be sent to a single partner AE.
10. The Verification Service is only supported as a utility function for Service staff. It is used only as a diagnostic tool.

4.2.12.3.1.2 Proposed Presentation Contexts

INSTANCE AVAILABILITY NOTIFICATION-SCU AE will propose Presentation Contexts as shown in the following table:

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 Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Instance Availability Notification	1.2.840.10008.5.1.4.33	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

Table 97: PROPOSED PRESENTATION CONTEXTS BY THE INSTANCE AVAILABILITY NOTIFICATION-SCU AE

4.2.12.3.1.3 SOP Specific Conformance for Verification SOP Class

The INSTANCE AVAILABILITY NOTIFICATION-SCU AE provides standard conformance to the Verification SOP Class as an SCU. The Verification Service as an SCU is actually only supported as a diagnostic service tool for network communication issues.

4.2.12.3.1.4 SOP Specific Conformance for Instance Availability Notification SOP Class

INSTANCE AVAILABILITY NOTIFICATION-SCU AE provides standard conformance to the supported Instance Availability Notification SOP Class as an SCU.

4.2.12.4 Association Acceptance Policy

The INSTANCE AVAILABILITY NOTIFICATION-SCU AE does not accept Associations.

4.2.13 Report-SCU Application Entity Specification

4.2.13.1 SOP Classes

The REPORT-SCU AE provides Conformance to the following Mitra Broker Private SOP Class:

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Mitra Report Management – FIND	1.2.840.113532.3500.8	Yes	No

Table 98: SOP CLASSES FOR REPORT-SCU AE

4.2.13.2 Association Establishment Policies

4.2.13.2.1 General

The REPORT-SCU AE forms Associations when requested to do so by the user. The REPORT-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:

Application Context Name	1.2.840.10008.3.1.1.1

Table 99: DICOM APPLICATION CONTEXT FOR REPORT-SCU AE

4.2.13.2.2 Number of Associations

For each report request one association to the C-FIND Destination AE is established by the REPORT-SCU AE. Report requests initiated automatically or from the user interface will be stored in a job queue and up to 14 report jobs can be performed simultaneously (8 high prior jobs, 4 medium prior jobs and 2 low prior jobs).

Maximum number of simultaneous Associations	Up to 14 (Not Configurable)

Table 100: NUMBER OF ASSOCIATIONS AS A SCU FOR REPORT-SCU AE

4.2.13.2.3 Asynchronous Nature

The REPORT-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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 101: ASYNCHRONOUS NATURE AS A SCU FOR REPORT-SCU AE

4.2.13.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 102: DICOM IMPLEMENTATION CLASS AND VERSION FOR REPORT-SCU AE

4.2.13.3 Association Initiation Policy

4.2.13.3.1 Activity – Send Report Requests to an External Peer AE

4.2.13.3.1.1 Description and Sequencing of Activity

The REPORT-SCU AE will initiate a new Association when the user performs the query action from the user interface or an automatic query is initiated after a new study is created. An Association Request is sent to the specified Mitra Broker and upon successful negotiation of the required Presentation Context the query is started. The result messages are transmitted in the same association. The reports are stored in a specific Results Folder in the form of text files. The administrator can configure if the Accession Number or the Requested Procedure ID is used to assign the reports to the belonging studies. When no assignment is possible the reports are moved to a folder for failed objects.

Visage 7 can set the report request status to 'Failed' if either a problem occurs with the DICOM communication or no appropriate report is provided by the Mitra Broker. This and the number of retries, the delay time between the retries and the delay time before the query is started are configurable on the administration interface. If the report query is initiated by the user the start delay time is ignored and the query is performed immediately.

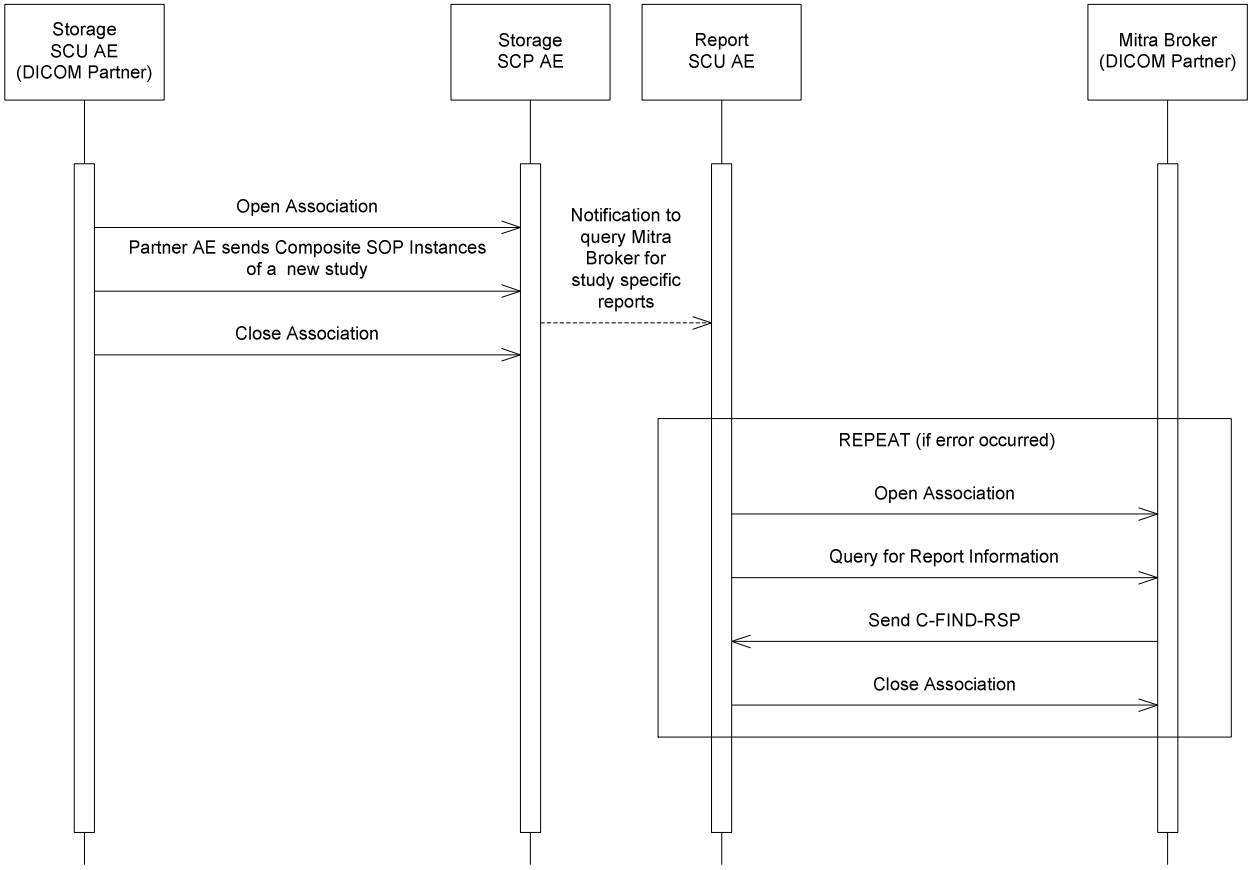

Figure 16: SEQUENCING OF ACTIVITY – PERFOMING AUTO REPORT REQUESTS

The following sequencing constraints illustrated in Figure 16 apply to the REPORT-SCU AE for initiating Mitra Report queries (C-FIND-Requests) triggered by a received SOP Instance for a new study:

1. Partner AE opens an Association with the STORAGE-SCP AE
2. Partner AE sends one or more Composite SOP Instances of a new study.
3. Partner AE closes the Association.
4. REPORT-SCU AE opens an Association with the Mitra Broker AE.
5. REPORT-SCU AE sends a C-FIND-RQ Message.
6. Mitra Broker AE returns a C-FIND-RSP Message to the REPORT-SCU AE with matching information.
7. REPORT-SCU AE closes the Association.
8. The points 4. – 7. Will be repeated if an error occurred during report request.

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

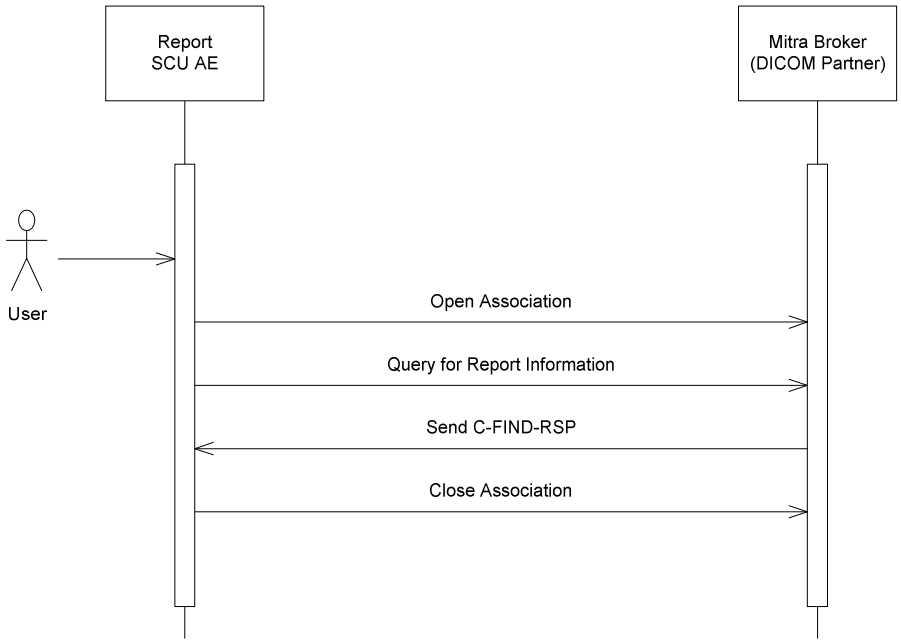

Figure 17: SEQUENCING OF ACTIVITY – PERFOMING USER REPORT REQUESTS

The following sequencing constraints illustrated in Figure 17 apply to the REPORT-SCU AE for initiating Mitra Report queries (C-FIND-Requests) triggered by the user:

1. User initiates a report request
2. REPORT-SCU AE opens an Association with the Mitra Broker AE.
3. REPORT-SCU AE sends a C-FIND-RQ Message.
4. Mitra Broker AE returns a C-FIND-RSP Message to the REPORT-SCU AE with matching information.
5. REPORT-SCU AE closes the Association.
6. The points 2. – 5. Will be repeated if an error occurred during report request.

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

4.2.13.3.1.2 Proposed Presentation Contexts

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

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 Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Mitra Report Management – FIND	1.2.840.113532.3500.8	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Table 103: PROPOSED PRESENTATION CONTEXTS BY THE REPORT-SCU AE

4.2.13.3.1.3 SOP Specific Conformance for Verification SOP Class

The REPORT-SCU AE provides standard conformance to the Verification SOP Class as an SCU. The Verification Service as an SCU is actually only supported as a diagnostic service tool for network communication issues.

4.2.13.3.1.4 SOP Specific Conformance for Report SOP Classes

REPORT-SCU provides private conformance to the Mitra Broker. No CANCEL requests are ever issued. In the table below the attributes to be matched are listed.

Attribute Name	Tag	VR	Types of Matching
Patient ID	(0010,0020)	LO	single value
Accession Number	(0008,0050)	SH	single value
Study ID	(0020,0010)	SH	single value
Study Instance UID	(0020,000D)	UI	single value
Requested Procedure ID	(0040,1001)	SH	single value
Specific Character Set	(0008,0005)	CS	universal
Interpretation Text	(4008,010B)	ST	universal
Impressions	(4008,0300)	ST	universal

Table 104: REPORT C-FIND SCU REQUESTED ELEMENTS

Note: Patient ID and one of Accession Number, Study ID, Study Instance UID or Requested Procedure ID are required in the query request message.

4.2.13.4 Association Acceptance Policy

The REPORT-SCU AE does not accept Associations.

4.2.14 Print-SCU Application Entity Specification

4.2.14.1 SOP Classes

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

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9	Yes	No
Basic Color Print Management Meta	1.2.840.10008.5.1.1.18	Yes	No
Print Job	1.2.840.10008.5.1.1.14	Yes	No

Table 105: SOP CLASSES FOR PRINT-SCU AE

4.2.14.2 Association Establishment Policies

4.2.14.2.1 General

The PRINT-SCU AE forms Associations when requested to do so by the user. The PRINT-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:

Application Context Name	1.2.840.10008.3.1.1.1

Table 106: DICOM APPLICATION CONTEXT FOR PRINT-SCU AE

4.2.14.2.2 Number of Associations

For each print request one association to the Print Destination AE is established by the PRINT-SCU AE. Report requests initiated from the user interface will be stored in a job queue. The PRINT-SCU AE performes only one print job at a time to reduce memory consumption of Visage 7.

Maximum number of simultaneous Associations	1 (Not Configurable)

Table 107: NUMBER OF ASSOCIATIONS AS A SCP FOR PRINT-SCU AE

4.2.14.2.3 Asynchronous Nature

The PRINT-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.

Maximum number of outstanding asynchronous transactions	1 (Not Configurable)

Table 108: ASYNCHRONOUS NATURE AS A SCP FOR PRINT-SCU AE

4.2.14.2.4 Implementation Identifying Information

All Visage 7 AE's use the same Implementation Class UID and the same Implementation Version Name. This Version Name is updated with each new release of the product software, as the different AE versions are never released independently.

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 109: DICOM IMPLEMENTATION CLASS AND VERSION FOR PRINT-SCU AE

4.2.14.3 Association Initiation Policy

4.2.14.3.1 Activity – Send Print Requests to an External Peer AE

4.2.14.3.1.1 Description and Sequencing of Activity

The PRINT-SCU AE will initiate a new Association when the user invokes the PRINT-SCU AE to print images. The user will issue such a command whenever images are selected on the user interface and it is requested to send them to a preconfigured remote AE for printing. Before the DICOM communication is established the film sheets are prepared and buffered to guaranty a fast transfer of print object data and to avoid running into timeouts. During the preparation process color images are converted to grayscale objects if the Partner AE doesn't provide support for the Basic Color Print Management SOP Class. The color to grayscale conversion is also performed if this is desiered by the user. Then an Association Request is sent to the specified Destination AE and upon successful negotiation of the required Presentation Context the print process is started. After the status of the printer is checked and a ready for printing status is reported the PRINT-SCU AE initiates the creation of a single Film Session. The printing of the film sheets is always performed on Film Box level by creating, filling, printing and deleting Film Boxes in a loop dependent on the number of requested film sheets (layout). A running print job can be cancelled by the user at any time by sending a delete request on Film Session Level. The Association will be released when the PRINT-SCU AE has sent all request messages or when the Partner AE reports the execution of each of the initiated Print Jobs (only if Print Job SOP Class is negotiated and N-EVENT-REPORT support is activated).

If any type of error occurs during transmission (either a communication failure or indicated by a Status Code returned by the Partner AE) over an open Association then the sending of print request messages is halted and the occurred failure is reported to the user.

A new Association will be opened to retry sending outstanding print request messages. The number of retries, the delay time between the retries and the delay time before the print job is initiated is configurable on the administration interface.

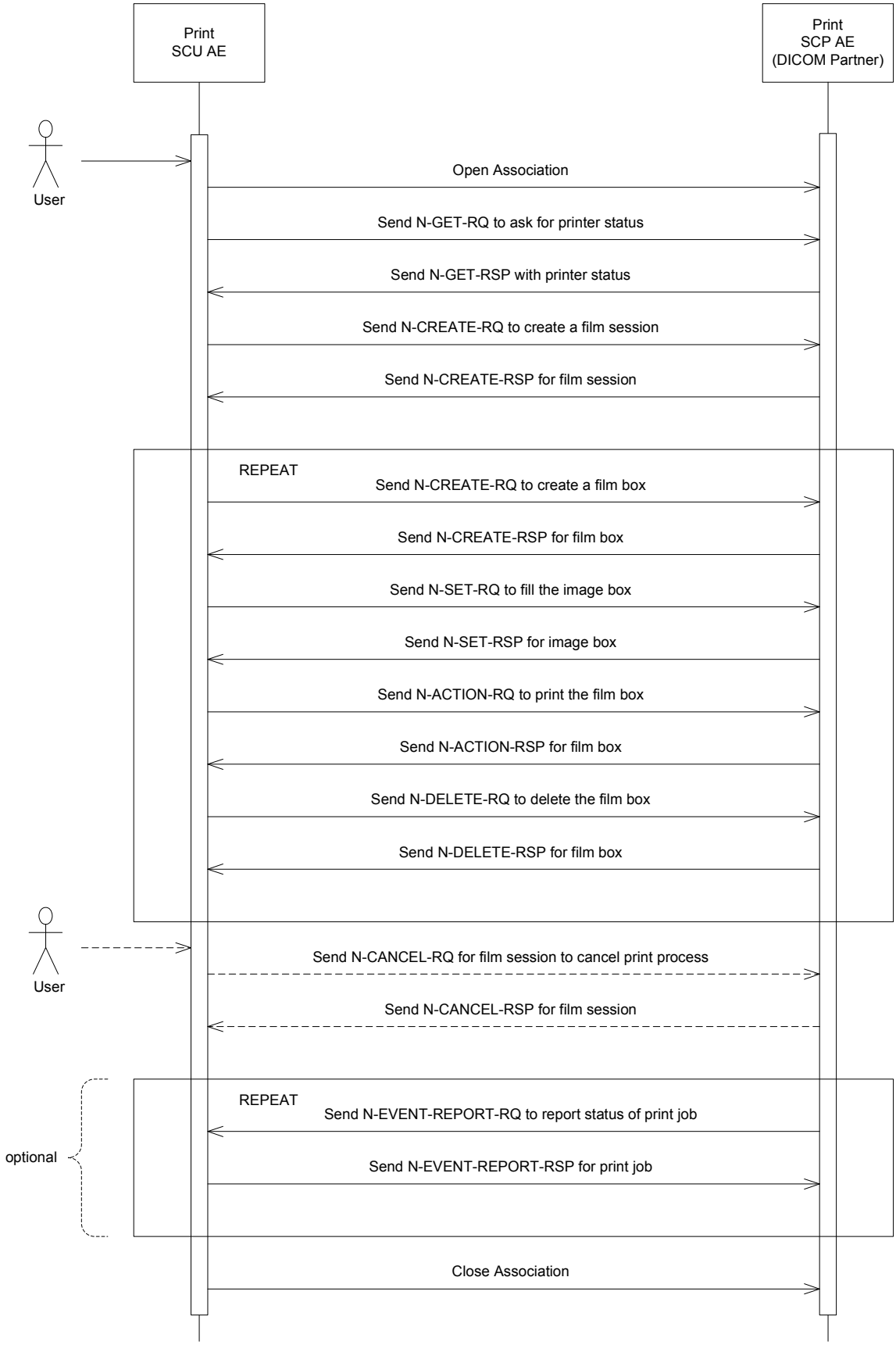

Figure 18: SEQUENCING OF ACTIVITY – PERFORMING PRINT REQUESTS

The following sequencing constraints illustrated in Figure 18 apply to the PRINT-SCU AE for initiating print requests:

1. PRINT-SCU AE opens an Association with the Partner AE.
2. PRINT-SCU AE sends a N-GET-RQ Message to obtain current printer status information.
3. Partner AE sends a N-GET-RSP Message with the current printer status to the PRINT-SCU AE. If the Printer reports a status of FAILURE the outstanding print job is not performed.
4. PRINT-SCU AE sends a N-CREATE-RQ Message to create a Film Session.
5. Partner AE sends a N-CREATE-RSP Message to the PRINT-SCU AE to indicate the reception of the request.
6. PRINT-SCU AE sends a N-CREATE-RQ Message to create a Film Box with one Image Box (PRINT-SCU AE only supports the format STANDARD\1,1).
7. Partner AE sends a N-CREATE-RSP Message to the PRINT-SCU AE to indicate the reception of the request.
8. PRINT-SCU AE sends a N-SET-RQ Message to fill the Image Box.
9. Partner AE sends a N-SET-RSP Message to the PRINT-SCU AE to indicate the reception of the request.
10. PRINT-SCU AE sends a N-ACTION-RQ Message to initiate printing of the Film Box. Partner AE creates a Print Job (if configured for PRINT-SCU AE and supported by Partner AE).
11. Partner AE sends a N-ACTION-RSP Message to the PRINT-SCU AE to indicate the reception of the request.
12. PRINT-SCU AE sends a N-DELETE-RQ Message to delete the Film Box.
13. Partner AE sends a N-DELETE-RSP Message to the PRINT-SCU AE to indicate the reception of the request.
14. The points 6. – 13. Will be repeated for each film sheet to be printed.
15. Partner AE sends N-EVENT-REPORT-RQ Messages to report each status change of the created Print Jobs (if Print Job support is configured for PRINT-SCU AE and supported by PRINT-SCP AE).
16. PRINT-SCU AE sends a N-EVENT-REPORT-RSP Message to indicate the reception of the request (if Print Job support is configured for PRINT-SCU AE and supported by PRINT-SCP AE).

17. When the user cancels a running print request PRINT-SCU AE sends a N-DELETE-RQ Message to delete the Film Session. Partner AE sends a N-DELETE-RSP Message to the PRINT-SCU AE to indicate the reception of the request.
18. Incomming N-EVENT-REPORT-RQ Messages sent by the Partner AE to report the printer status are not evaluated by PRINT-SCU AE but only responded with N-EVENT-REPORT-RSP Messages.

19. PRINT-SCU AE closes the Association.

20. The print request is repeated a configurable number of times if transfer of Print Messages failed.
21. The Verification Service is only supported as a utility function for Service staff. It is used only as a diagnostic tool.

4.2.14.3.1.2 Proposed Presentation Contexts

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

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 Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Basic Grayscale Print Management Meta	1.2.840.10008.1.1.9	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Basic Color Print Management Meta	1.2.840.10008.1.1.18	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None
Print Job	1.2.840.10008.1.1.14	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

Table 110: PROPOSED PRESENTATION CONTEXTS BY THE PRINT-SCU AE

4.2.14.3.1.3 SOP Specific Conformance for Verification SOP Class

The PRINT-SCU AE provides standard conformance to the Verification SOP Class as an SCU. The Verification Service as an SCU is actually only supported as a diagnostic service tool for network communication issues.

4.2.14.3.1.4 SOP Specific Conformance for Basic Grayscale Print Management Meta SOP Class

The PRINT-SCU AE supports the following SOP Classes as defined by the Basic Grayscale Print Management Meta SOP Class.

SOP Class Name	SOP Class UID	SCU	SCP
Basic Film Session	1.2.840.10008.5.1.1.1	Yes	No
Basic Film Box	1.2.840.10008.5.1.1.2	Yes	No
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	Yes	No
Printer	1.2.840.10008.5.1.1.16	Yes	No

Table 111: SOP CLASSES FOR BASIC GRAYSCALE PRINT MANAGEMENT META SOP CLASS

4.2.14.3.1.4.1 SOP Specific Conformance for Basic Film Session SOP Class

The PRINT-SCU AE supports the following DIMSE Services for the Basic Film Session SOP Class:

- N-CREATE
- N-DELETE

4.2.14.3.1.4.1.1 Basic Film Session SOP Class Operations for N-CREATE

The PRINT-SCU AE sends a N-CREATE Request to the PRINT-SCP AE to initiate the creation of a Basic Film Session SOP Instance. The attributes supplied by the PRINT-SCU AE with a N-CREATE Request Message are listed in the following table.

Attribute Name	Tag	Possible Values	Configured by[1]
Number of Copies	(2000,0010)	1 … n	User
Print Priority	(2000,0020)	LOW, MED, HIGH	User
Medium Type	(2000,0030)	PAPER, CLEAR FILM, BLUE FILM	User

Table 112: BASIC FILM SESSION SOP CLASS N-CREATE REQUEST ATTRIBUTES

Note: 1. The administrator predefines the values that are provided to the user depending on the selected Partner AE.

4.2.14.3.1.4.1.2 Basic Film Session SOP Class Operations for N-DELETE

The PRINT-SCU AE sends a N-DELETE Request to the Partner AE to cancel a running print request.

4.2.14.3.1.4.2 SOP Specific Conformance for Basic Film Box SOP Class

The PRINT-SCU AE supports the following DIMSE Services for the Basic Film Box SOP Class:

- N-CREATE
- N-ACTION
- N-DELETE

4.2.14.3.1.4.2.1 Basic Film Box SOP Class Operations for N-CREATE

The PRINT-SCU AE sends a N-CREATE Request to the PRINT-SCP AE to initiate the creation of a Basic Film Box SOP Instance. The attributes supplied by the PRINT-SCU AE with a N-CREATE Request Message are listed in the following table.

Attribute Name	Tag	Possible Values	Configured by[1]
Image Display Format	(2010,0010)	STANDARD\1,1	Auto[2]
Film Orientation	(2010,0040)	PORTRAIT, LANDSCAPE	User
Film Size ID	(2000,0050)	8INX10IN, 8_5INX11IN, 10INX12IN, 10INX14IN, 11INX14IN, 14INX14IN, 14INX17IN, A3, A4	User[3]
Magnification Type	(2010,0060)	REPLICATE, BILINEAR, CUBIC, NONE	Admin
Border Density	(2010,0100)	BLACK, WHITE	Admin
Min Density	(2010,0120)	0 … n	Admin
Max Density	(2010,0130)	0 … n	Admin
Configuration Information	(2010,0150)		Admin
Referenced Film Session Sequence	(2010,0500)		
> Referenced SOP Class UID	(0008,1150)		Auto
> Referenced SOP Instance UID	(0008,1155)		Auto

Table 113: BASIC FILM BOX SOP CLASS N-CREATE REQUEST ATTRIBUTES

Notes:
1. The administrator predefines the values that are provided to the user depending on the selected Partner AE.
2. Visage 7 converts the film sheet always to a STANDARD\1,1 page independent from the layout format selected by the user.
3. The film size is provided to the user in form of Media Data Sets that are predefined by the administrator. These Media Data Sets represent a combination of film size and resolution and are identified by a significant alias name.

4.2.14.3.1.4.2.2 Basic Film Box SOP Class Operations for N-ACTION

The PRINT-SCU AE sends a N-ACTION Request to instruct the PRINT-SCP AE to print the contents of the Film Box. If a Presentation Context for the Print Job SOP Class has been negotiated the Print Job SOP Instance UID is read from the N-ACTION Reponse as a reference for evaluating subsequent Print Job status messages.

4.2.14.3.1.4.2.3 Basic Film Box SOP Class Operations for N-DELETE

The PRINT-SCU AE sends a N-DELETE Request to the PRINT-SCP AE to delete the last created Basic Film Box SOP Instance.

4.2.14.3.1.4.3 SOP Specific Conformance for Basic Grayscale Image Box SOP Class

The PRINT-SCU AE supports the following DIMSE Service for the Basic Grayscale Image Box SOP Class:

- N-SET

4.2.14.3.1.4.3.1 Basic Grayscale Image Box SOP Class Operations for N-SET

The PRINT-SCU AE sends a N-SET Request to the PRINT-SCP AE to provide the Basic Grayscale Image Box SOP Instance with presentation parameters and pixel data which apply to a single image of a sheet of film. The Basic Film Box SOP Instance is created when a N-CREATE Request on Film Box level is performed. The attributes supplied by the PRINT-SCU AE with a N-SET Request Message are listed in the following table.

Attribute Name	Tag	Possible Values	Configured by
Image Position	(2020,0010)	1	Auto[1]
Basic Grayscale Image Sequence	(2020,0110)		
> Pixel Aspect Ratio	(0028,0034)		Auto
> Samples Per Pixel	(0028,0002)	1	Auto
> Photometric Interpretation	(0028,0004)	MONOCHROME1, MONOCHROME2	Auto
> Rows	(0028,0010)		Auto
> Columns	(0028,0011)		Auto
> Bits Allocated[2]	(0028,0100)	8 (if Bits Stored = 8) 16 (if Bits Stored = 10, 12)	Auto
> Bits Stored[2]	(0028,0101)	8, 10, 12	Auto
> High Bit[2]	(0028,0102)	8 (if Bits Stored = 8) 9 (if Bits Stored = 10) 11 (if Bits Stored = 12)	Auto
> Pixel Representation	(0028,0103)	0	Auto
> Pixel Data	(7FE0,0010)		Auto

Table 114: BASIC GRAYSCALE IMAGE BOX SOP CLASS N-SET REQUEST ATTRIBUTES

Notes:
1. Only one Basic Grayscale Image Box is available because the Image Display Format is always set to STANDARD\1,1 when creating a Basic Film Box SOP Instance.
2. Normally the original bit depth of the images is used. The administrator can specify a lower value for Partner AE's with a restricted bit depth.

4.2.14.3.1.4.4 SOP Specific Conformance for Printer SOP Class

The PRINT-SCU AE supports the following DIMSE Services for the Printer SOP Class:

- N-GET
- N-EVENT-REPORT

4.2.14.3.1.4.4.1 Printer SOP Class Operations for N-GET

The PRINT-SCU AE sends a N-GET Request to the PRINT-SCP AE to obtain information about the current printer status. The attributes supplied by the PRINT-SCU AE with a N-GET Request Message are listed in the following table.

Attribute Name	Tag	VR	Types of Matching
Printer Status	(2110,0010)	CS	universal
Printer Status Info	(2110,0020)	CS	universal
Printer Name	(2110,0030)	LO	universal
Manufacturer	(0008,0070)	LO	universal
Manufacturer Model Name	(0008,1090)	LO	universal
Device Serial Number	(0018,1000)	LO	universal
Software Versions	(0018,1020)	LO	universal
Date of Last Calibration	(0018,1200)	DA	universal
Time of Last Calibration	(0018,1201)	TM	universal

Table 115: PRINTER SOP CLASS N-GET REQUEST ATTRIBUTES

The Printer Status (2110,0010) reported with the response message is evaluated as follows:

- NORMAL: Printer is ready for printing. The PRINT-SCU AE continues with the print process.
- WARNING: Printer is ready for printing but in a warning status. The PRINT-SCU AE reports the Printer Status Info (2110,0020) to the user and continues the print process.
- FAILURE: Printer is not ready for printing. The PRINT-SCU AE reports the Printer Status Info (2110,0020) to the user and aborts the print process.

The return values of the other attributes are only used for trace purpose.

4.2.14.3.1.4.4.2 Printer SOP Class Operations for N-EVENT-REPORT

The PRINT-SCU AE responds to received N-EVENT-REPORT requests always with status ‘Success’ (0x0000). The reported status information is not evaluated by the PRINT-SCU AE.

4.2.14.3.1.5 SOP Specific Conformance for Basic Color Print Management Meta SOP Class

The PRINT-SCU AE supports the following SOP Classes as defined by the Basic Color Print Management Meta SOP Class.

SOP Class Name	SOP Class UID	SCU	SCP
Basic Film Session	1.2.840.10008.5.1.1.1	Yes	No
Basic Film Box	1.2.840.10008.5.1.1.2	Yes	No
Basic Color Image Box	1.2.840.10008.5.1.1.4.1	Yes	No
Printer	1.2.840.10008.5.1.1.16	Yes	No

Table 116: SOP CLASSES FOR BASIC COLOR PRINT MANAGEMENT META SOP CLASS

4.2.14.3.1.5.1 SOP Specific Conformance for Basic Film Session SOP Class

Refer to section ‘SOP Specific Conformance for Basic Film Session SOP Class’ in the chapter ‘Basic Grayscale Print Management Meta SOP Class’.

4.2.14.3.1.5.2 SOP Specific Conformance for Basic Film Box SOP Class

Refer to section ‘SOP Specific Conformance for Basic Film Box SOP Class’ in the chapter ‘Basic Grayscale Print Management Meta SOP Class’.

4.2.14.3.1.5.3 SOP Specific Conformance for Basic Color Image Box SOP Class

The PRINT-SCU AE supports the following DIMSE Service for the Basic Color Image Box SOP Class:

- N-SET

4.2.14.3.1.5.3.1 Basic Color Image Box SOP Class Operations for N-SET

The PRINT-SCU AE sends a N-SET Request to the PRINT-SCP AE to provide the Basic Color Image Box SOP Instance with presentation parameters and pixel data which apply to a single image of a sheet of film. The Basic Film Box SOP Instance is created when a N-CREATE Request on Film Box level is performed. The attributes supplied by the PRINT-SCU AE with a N-SET Request Message are listed in the following table.

Attribute Name	Tag	Possible Values	Configured by
Image Position	(2020,0010)	1	Auto[1]
Basic Color Image Sequence	(2020,0111)		
> Pixel Aspect Ratio	(0028,0034)		Auto
> Samples Per Pixel	(0028,0002)	3	Auto
> Photometric Interpretation	(0028,0004)	RGB	Auto
> Planar Configuration	(0028,0006)	1	Auto
> Rows	(0028,0010)		Auto
> Columns	(0028,0011)		Auto

> Bits Allocated	(0028,0100)	8	Auto
> Bits Stored	(0028,0101)	8	Auto
> High Bit	(0028,0102)	7	Auto
> Pixel Representation	(0028,0103)	0	Auto
> Pixel Data	(7FE0,0010)		Auto

Table 117: BASIC COLOR IMAGE BOX SOP CLASS N-SET REQUEST ATTRIBUTES

Note: 1. Only one Basic Color Image Box is available because the Image Display Format is always set to STANDARD\1,1 when creating a Basic Film Box SOP Instance.

4.2.14.3.1.5.4 SOP Specific Conformance for Printer SOP Class

Refer to section ‘SOP Specific Conformance for Printer SOP Class’ in the chapter ‘Basic Grayscale Print Management Meta SOP Class’.

4.2.14.3.1.6 SOP Specific Conformance for Print Job SOP Class

The PRINT-SCU AE supports the following DIMSE Service for the Print Job SOP Class:

- N-EVENT-REPORT

4.2.14.3.1.6.1 Print Job SOP Class Operations for N-EVENT-REPORT

The PRINT-SCU AE is capable of receiving N-EVENT-REPORT requests. N-EVENT-REPORT is used to report the execution status change of previously created Print Jobs to the SCU in an asynchronous way.

Note: There are DICOM printers at the market with disabled sending of N-EVENT-REPORT request messages by default. For such systems it is possible either to activate the N-EVENT-REPORT sending or to configure the PRINT-SCU AE not to wait for N-EVENT-REPORT request messages even though the Print Job SOP Class is negotiated.

The attributes supplied by the Partner AE with a N-EVENT-REPORT Request Message and evaluated by the PRINT-SCU AE are listed in the following table.

Attribute Name	Tag	Possible Values
Event Type ID	(0000,1002)	1: PENDING 2: PRINTING 3: DONE 4: FAILURE
Execution Status Info	(2100,0030)	

The Event Type ID (0000,1002) reported with the request message is evaluated as follows:

- PENDING: Print Job is pending. PRINT-SCU AE continues waiting until Print Job is processed.
- PRINTING: Print Job is is being printed. PRINT-SCU AE continues waiting until Print Job is processed.
- DONE: Print Job is performed successfully. PRINT-SCU AE stops waiting.
- FAILURE: Print Job processing failed. PRINT-SCU AE stops waiting and reports the Execution Status Info (2100,0030) to the user.

If the Partner AE supports the Print Job SOP Class and N-EVENT-REPORT message sending is activated the PRINT-SCU AE waits until a N-EVENT-REPORT Request with status ‘DONE’ or ‘FAILURE’ is received for each of the previously created Print Jobs before the association is closed.

4.2.14.4 Association Acceptance Policy

The PRINT-SCU AE does not accept Associations.

4.3 Physical Network Interfaces

4.3.1 Supported Communication Stacks

Visage 7 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

Visage 7 DICOm AEs inherit their TCP/IP stack from the Windows 2003® Operating System upon which they execute.

4.3.2 Physical Network Interface

Visage 7 DICOM components are indifferent to the physical medium over which TCP/IP executes; they inherit this from the Windows 2003® Operating System upon which they execute.

4.3.3 Additional Protocols

When host names rather than IP addresses are used in the configuration properties to specify presentation addresses for remote AEs, the application is dependent on the name resolution mechanism of the underlying operating system

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 Staff.

Application Entity	Role	Default AE Title	Default TCP/IP Port
STORAGE-SCU	SCU	-	-
STORAGE COMMITMENT-SCU	SCU		
STORAGE-SCP	SCP	DW_SCP	2010
QUERY-SCU	SCU	-	-
RETRIEVE-SCU	SCU	-	-
QUERY-RETRIEVE-SCP (Level A)	SCP	DW_QR_LA	2010
QUERY-RETRIEVE-SCP (Level B)	SCP	DW_QR_LB	2010
QUERY-RETRIEVE-SCP (Archive Level)	SCP	DW_QR_ARCHIVE	2010
MODALITY-WORKLIST-SCP	SCP	same as QUERY-RETRIEVE-SCPs	2010
PPS-SCP	SCP	same as STORAGE-SCP	2010
PPS-SCU	SCU	-	-
INSTANCE AVAILABILITY NOTIFICATION-SCU	SCU	-	-
REPORT-SCU	SCU	-	-
PRINT-SCU	SCU	-	-

Table 118: DEFAULT APPLICATION ENTITY CHARACTERISTICS

All Application Entities can be configured to have the same AE Title except the AETs of QUERY-RETRIEVE-SCP (Level A), QUERY-RETRIEVE-SCP (Level B) and QUERY-RETRIEVE-SCP (Archive Level) must differ.

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 Staff. This mapping is necessary for resolving the IP address and port of C-MOVE Destination and Storage Commitment Result Receiving Application Entities.

4.4.2 Parameters

Visage 7 configuration parameters related to DICOM communications are below. A blank cell under the 'Default Value' heading indicates that there is no default value for the specific configuration attribute.

Parameter	Configurable	Default Value
General Parameters		
DICOM Query Archive Status	Yes	Use DICOM Attribute [Instance Availability (Tag 0008,0056)]
DICOM SOP Class for 3D Snapshots	Yes	Use DICOM SOP Class Multi-frame True Color Secondary Capture Image Storage (1.2.840.10008.5.1.4.1.1.7.4)
Promiscous Mode	Yes	Accept DICOM Objects only from Configured Partners
Report Request Status	Yes	Request Failed on Missing Report
General SCP Parameters		
TCP/IP Listen Port	Yes	2010
Maximum PDU length [byte]	Yes	16384
Maximum number of DICOM connections	Yes	16
DICOM Timeout [sec]	Yes	60
Number of retries to read incoming messages	No	10
General SCU Parameters		
Maximum PDU length [byte]	Yes	16384
DICOM Timeout [sec]	Yes	60
Number of Retries (Storage Commitment)	Yes	3
Delay between Retries [sec] (Storage Commitment)	Yes	30
Timeout for Result [min] (Storage Commitment)	Yes	60
Number of Retries (Send)	Yes	3
Delay between Retries [min] (Send)	Yes	1
Number of Retries (PPS)	Yes	3
Delay between Retries [sec] (PPS)	Yes	60
STORAGE-SCU AE Parameters		
Own Application Entity Title	Yes	
Application Entity Title of Partner	Yes	
TCP/IP Port of Partner	Yes	
Remote hostname or TCP/IP address of Partner	Yes	
DICOM Read Timeout [sec]	Yes	30
Send SOP Instances always uncompressed	Yes	Disabled
Dicom Send	Yes	Disabled
Priority for Dicom Send	Yes	Medium
Dicom Quick Send	Yes	Disabled
Priority for Dicom Quick Send	Yes	Medium

Application Entity Title of Storage Commitment-SCP Partner that Storage Commitment N-ACTION requests are sent to	Yes	none
Number of days that pass between Image sent and Storage Commitment N-ACTION request	Yes	5
Local time for Storage Commitment N-ACTION request	Yes	02:15
Number of SOP Instance UIDs per Storage Commitment N-ACTION request transaction	Yes	5000
STORAGE-SCP AE Parameters		
Application Entity Title	Yes	DW_SCP
Application Entity Title of Partner	Yes	
TCP/IP Port of Partner (Storage Commitment)	Yes	
Remote hostname or TCP/IP address of Partner (Storage Commitment)	Yes	
DICOM Read Timeout [sec]	Yes	30
QUERY-/RETRIEVE-SCU AE Parameters		
Own Application Entity Title for Query	Yes	
Own Application Entity Title for Retrieve	Yes	
Application Entity Title of Partner	Yes	
TCP/IP Port of Partner	Yes	
Remote hostname or TCP/IP address of Partner	Yes	
DICOM Read Timeout [sec]	Yes	30
Priority	Yes	Medium
Retrieve job timeout [min] (Global Setting)	Yes	60
Send DICOM echo before query (Global Setting)	Yes	Off
Maximum number of study records to be returned as query results (Global Setting)	Yes	200
QUERY-RETRIEVE-SCP AE Parameters (Level A)		
Application Entity Title	Yes	DW_QR_LA
Application Entity Title of Partner	Yes	
TCP/IP Port of Partner	Yes	
Send SOP Instances always uncompressed	Yes	Disabled
QUERY-RETRIEVE-SCP AE Parameters (Level B)		
Application Entity Title	Yes	DW_QR_LB
Application Entity Title of Partner	Yes	
TCP/IP Port of Partner	Yes	
Send SOP Instances always uncompressed	Yes	Disabled
QUERY-RETRIEVE-SCP AE Parameters (Archive Level)		
Application Entity Title	Yes	DW_QR_ARCHIVE
Application Entity Title of Partner	Yes	
TCP/IP Port of Partner	Yes	
Send SOP Instances always uncompressed	Yes	Disabled
REPORT SCU AE Parameters		
Own Application Entity Title	Yes	

Application Entity Title of Partner	Yes	
TCP/IP Port of Partner	Yes	
Remote hostname or TCP/IP address of Partner	Yes	
DICOM Read Timeout [sec]	Yes	30
Assign the Reports to Study by Accession Number or Request ID	Yes	Accession Number
Priority	Yes	Medium
Auto Report Query	Yes	Disabled
Delay Time at Start [sec]	Yes	
Number of Retries	Yes	
Delay Time between Retries [sec]	Yes	
MODALITY WORKLIST SCP AE Parameters		
Application Entity Title	Yes	DW_QR_LA DW_QR_LB DW_QR_ARCHIVE
Application Entity Title of Partner	Yes	
PPS SCP AE Parameters		
Application Entity Title	Yes	DW_SCP
Application Entity Title of Partner	Yes	
PPS SCU AE Parameters		
Own Application Entity Title	Yes	
Application Entity Title of Partner	Yes	
TCP/IP Port of Partner	Yes	
Remote hostname or TCP/IP address of Partner	Yes	
DICOM Read Timeout [sec]	Yes	30
Priority	Yes	Medium
Number of Retries	Yes	
Delay Time between Retries [sec]	Yes	
INSTANCE AVAILABILITY NOTIFICATION SCU AE Parameters		
Own Application Entity Title	Yes	
Application Entity Title of Partner	Yes	
TCP/IP Port of Partner	Yes	
Remote hostname or TCP/IP address of Partner	Yes	
DICOM Read Timeout [sec]	Yes	30
Priority	Yes	Medium
Print SCU AE Parameters		
Own Application Entity Title	Yes	
Application Entity Title of Partner	Yes	
TCP/IP Port of Partner	Yes	
Remote hostname or TCP/IP address of Partner	Yes	
DICOM Read Timeout [sec]	Yes	30
Priority	Yes	Medium
Dicom Printer	Yes	

Partner sends N-EVENT-REPORTS to signal job status	Yes	Enabled
Delay Time at Start [sec]	Yes	
Number of Retries	Yes	
Delay Time between Retries [sec]	Yes	
Print Header	Yes	Information about Patient's Name, Patient ID and Patient's Birth Date
Print Footer	Yes	Information about Study Date and Time and Page Number

Table 119: CONFIGURATION PARAMETERS

5. Media Storage

5.1 Implementation Model

5.1.1 Application Data Flow

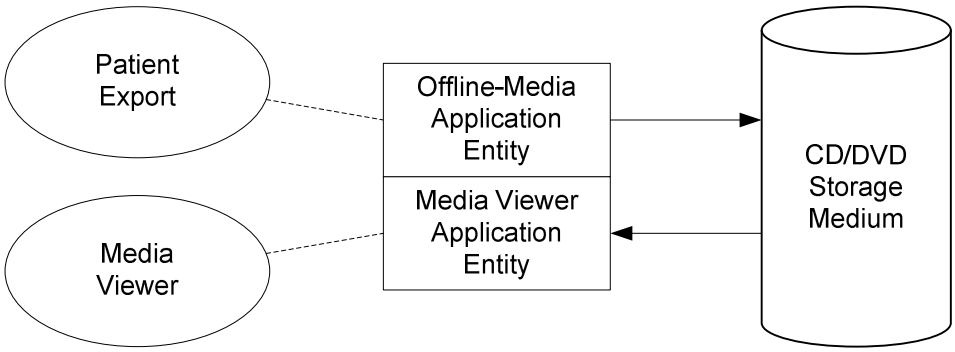

Figure 19: DICOM DATA FLOW DIAGRAM FOR MEDIA STORAGE

The Offline-Media Application Entity exports DICOM objects from Visage 7 Online to a CD/DVD Storage medium. It is associated with the Real-World Activity “Patient Export”. “Patient Export” is performed upon user request for selected patients. An export of SOP Instances stored in Visage 7 Archive is not supported.

The Media Viewer Application Entity loads a user-selected file which may be a DICOMDIR or Image from a CD/DVD Storage medium into the Media Viewer for browsing the media contents and displaying a user selected image set in the Viewer window.

5.1.2 Functional Definition of AEs

5.1.2.1 Functional Definition of Offline-Media Application Entity

Activation of the “Patient Export” icon will pass the currently selected patients to the Offline-Media Application Entity. The SOP Instances associated with the selection will be collected into one export job. The contents of each export job will be written to a single CD/DVD media.

5.1.2.2 Functional Definition of Media Viewer Application Entity

The Media Viewer Application Entity is represented by the Media Viewer application which is copied together with the SOP Instances that are selected for an export job to the CD/DVD media. The Media Viewer is activated through the user interface by selecting directories, images and DICOMDIRs for display.

5.1.3 Sequencing of Real-World Activities

At least one patient must exist and be selected before the Offline-Media Application Entity can be invoked. For CD/DVD creation a production server is used so it is necessary that there is a blank CD/DVD available in the media producing system.

A CD/DVD with the Media Viewer application has to be created with the Offline-Media Application Entity before the Media Viewer can be used to browse and display the media contents.

5.1.4 File Meta Information Options

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

Implementation Class UID	1.2.276.0.45.1.1.0.70.20091124
Implementation Version Name	DicomWeb_70

Table 120: DICOM IMPLEMENTATION CLASS AND VERSION FOR MEDIA STORAGE

5.2 AE Specifications

5.2.1 Offline-Media Application Entity Specification

The Offline-Media Application Entity provides standard conformance to the DICOM Interchange Option of the Media Storage Service Class. The Application Profiles and roles are listed in the following table.

Application Profiles Supported	Real World Activity	Role	SC Option
STD-GEN-CD	Patient Export	FSC	Interchange

Table 121: APPLICATION PROFILES, ACTIVITIES AND ROLES FOR OFFLINE-MEDIA

5.2.1.1 File Meta Information for the Application Entity

The Source Application Entity Title used for DICOMDIR creation corresponds to the AET specified for the STORAGE-SCP AE. This value is also inserted in the DICOM files which are lossy compressed by Visage 7 Online. All other exported files contain the Application Entity Title of the Partner AE which sends the SOP Instance to Visage 7.

5.2.1.2 Real-World Activities

5.2.1.2.1 Activity – Patient Export

The Offline-Media Application Entity acts as a FSC using the interchange option when requested to export SOP Instances from the local database to a CD/DVD medium.

The data size of the selected patients to be exported is displayed to the user. It is not possible to start the export job if the amount of data exceeds the maximum data size which can be configured on the administration interface.

The contents of the export job will be written with or without a corresponding DICOMDIR to a single-session CD/DVD (configurable). Writing in multi-session mode is not supported.

5.2.1.2.1.1 Media Storage Application Profiles

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

5.2.1.2.1.2 Options

The Offline-Media Application Entity supports the same SOP Classes and Transfer Syntaxes as the STORAGE-SCU AE listed in Table 8 and Table 9. Additionally the following SOP Class and Transfer Syntax is used for DICOMDIR creation.

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1

Table 122: IODS, SOP CLASSES AND TRANSFER SYNTAXES FOR OFFLINE-MEDIA

5.2.2 Media Viewer Application Entity Specification

The Media Viewer Application Entity provides standard conformance to the DICOM Interchange Option of the Media Storage Service Class. The Application Profiles and roles are listed in the following table.

Application Profiles Supported	Real World Activity	Role	SC Option
STD-GEN-CD	Media Viewer	FSR	Interchange

Table 123: APPLICATION PROFILES, ACTIVITIES AND ROLES FOR MEDIA VIEWER

5.2.2.1 File Meta Information for the Application Entity

Not applicable since the Media Viewer is not an FSC or FSU.

5.2.2.2 Real-World Activities

5.2.2.2.1 Activity – Load DICOMDIR, Directory or File

The Media Viewer Application Entity acts as a FSR using the interchange option when requested to browse DICOMDIRs or display SOP Instances from a CD/DVD medium.

If a DICOMDIR or directory is loaded a browser will be displayed from which instances may be selected that are in turn displayed to the user.

If the file is an image instance it will be loaded and displayed directly.

5.2.2.2.1.1 Media Storage Application Profiles

The Media Viewer Application Entity supports the STD-GEN-CD Application Profile.

5.2.2.2.1.2 Options

The Offline-Media Application Entity supports the same SOP Classes and Transfer Syntaxes as the STORAGE-SCP AE listed in Table 32 and Table 33. Additionally the following SOP Class and Transfer Syntax is used for DICOMDIR reading.

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1

Table 124: IODS, SOP CLASSES AND TRANSFER SYNTAXES FOR MEDIA VIEWER

5.3 Augmented and Private Application Profiles

Visage 7 does not support any augmented for private application profiles.

5.4 Configuration

The generation and export of a DICOMDIR file can be switched on/off via administration interface. Additionally the administrator can specify if the Media Viewer is copied with the export data to the medium.

6. Support of Extended Character Sets

All Visage 7 DICOM applications support the following extended character set:

ISO_IR 100 (ISO 8859-1:1987 Latin Alphabet No. 1 supplementary set)

As well as supporting this Extended Character Set for DICOM messaging, the Query-Server system database and user interface can support the expected display of this character set.

The use of any other extended character sets may produce incorrect and unreadable output on the Web interface.

7. Security

7.1 Security Profiles

None supported.

7.2 Association Level Security

An association request is only accepted by Visage 7 if the called AE Title is equivalent to the AE Title of one of the SCP AEs. Additionally the calling AE Title is checked in order to give only those DICOM Partner Nodes the permission for accessing Visage 7 which are configured on the DICOM Partners page of the administration interface. The check of the calling AE Title can be switched off for incoming C-STORE and C-ECHO requests by choosing the Promiscuous Mode.
The Destination DICOM node for retrieving SOP Instances must be configured as a STORAGE-SCP Partner Node if it differs from the DICOM node which has initiated the retrieve request.

8. Annexes

8.1 IOD Contents of Created SOP Instances

8.1.1 Snapshot Image IOD

In Visage 7 it is possible to generate Snapshot Images from 3D volume files which can be stored locally or dispatched via STORAGE-SCU AE. The administrator can configure if the created Snapshots are provided as Secondary Capture or Mulfi-frame True Color Secondary Capture Images. Table 125 specifies the modules of the SOP Instances that are created by Visage 7. Modules which are only relevant for Mulfi-frame True Color Secondary Capture Images are marked with an asterisk. The Presence column gives information about the availabilty criteria of the particular module.

IE	Module	Reference	Presence
Patient	Patient	Table 126	Always
Study	General Study	Table 127	Always
Series	General Series	Table 128	Always
Equipment	General Equipment	Table 129	Always
	SC Equipment	Table 130	Always
Image	General Image	Table 131	Always
	Image Pixel	Table 132	Always
	Multi-frame*	Table 133	Always
	SC Image	Table 134	Always
	SC-Multi-frame Image*	Table 135	Always
	SC-Multi-frame Vector*	Table 136	If ‘Frame Increment Pointer’ (0028,0009) is present
	SOP Common	Table 137	Always

Table 125: IOD OF CREATED SOP INSTANCES

Table 126 - Table 137 specify the attributes of a Snapshot Image Image that is created by Visage Client. The Presence column gives information about the availabilty criteria of the particular attribute.

Attribute Name	Tag	VR	Value	Presence
Patient's Name	(0010,0010)	PN	*Value from source images*	Always (maybe empty)
Patient ID	(0010,0020)	LO	*Value from source images*	Always (maybe empty)
Patient's Birth Date	(0010,0030)	DA	*Value from source images*	Always (maybe empty)
Patient's Sex	(0010,0040)	CS	*Value from source images*	Always (maybe empty)

Table 126: PATIENT MODULE OF CREATED SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Study Instance UID	(0020,000D)	UI	*Value from source images*	Always
Study Date	(0008,0020)	DA	*Value from source images*	Always (maybe empty)
Study Time	(0008,0030)	TM	*Value from source images*	Always (maybe empty)
Referring Physicians Name	(0008,0090)	PN	*Value from source images*	Always (maybe empty)
Study ID	(0020,0010)	SH	*Value from source images*	Always (maybe empty)
Accession Number	(0008,0050)	SH	*Value from source images*	Always (maybe empty)

Table 127: GENERAL STUDY MODULE OF CREATED SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Series Description	(0008,103E)	LO	Snapshots	Always
Patient Position	(0018,5100)	CS	*Empty*	Always
Series Instance UID	(0020,000E)	UI	*New UID generated by Visage 7*	Always
Series Number	(0020,0011)	IS	*New ID generated by Visage 7*	Always

Table 128: GENERAL SERIES MODULE OF CREATED SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Institution Name	(0008,0080)	LO	*Value from source images*	If present in source images

Table 129: GENERAL EQUIPMENT MODULE OF CREATED SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Modality	(0008,0060)	CS	*Value from source images*	Always
Conversion Type	(0008,0064)	CS	SYN	Always
Secondary Capture Device Manufacturer	(0018,1016)	LO	Visage Imaging	Always
Secondary Capture Device Manufacturers Model Name	(0018,1018)	LO	Report Snapshot (key view image) **or** Batching Tool (stacked or rotational batch reconstructions) **or** Cine Editor (stacked or rotational batch reconstructions)	Always

Table 130: SC EQUIPMENT MODULE OF CREATED SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence

Instance Number	(0020,0013)	IS	1	Always
Image Type	(0008,0008)	CS	DERIVED\SECONDARY	Always
Content Date	(0008,0023)	DA	*Date of image creation*	Always
Content Time	(0008,0033)	TM	*Time of image creation*	Always
Derivation Description	(0008,2111)	ST	single volume snapshot (no manual image calibration) **or** "single volume snapshot (manual calibration)" (manual image calibration) **or** XX-YY Fusion (fusion images, XX,YY fused modalities)	Always
Patient Orientation	(0020,0020)	CS	*Patient Orientation relative to the image plane*	Always(maybe empty)

Table 131: GENERAL IMAGE MODULE OF CREATED SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Samples per Pixel	(0028,0002)	US	3	Always
Photometric Interpretation	(0028,0004)	CS	RGB	Always
Planar Configuration	(0028,0006)	US	0	Always
Rows	(0028,0010)	US	*Number of Rows*	Always
Columns	(0028,0011)	US	*Number of Columns*	Always
Bits Allocated	(0028,0100)	US	8	Always
Bits Stored	(0028,0101)	US	8	Always
High Bit	(0028,0102)	US	7	Always
Pixel Representation	(0028,0103)	US	0	Always
Pixel Data	(7FE0,0010)	OW	*Pixel samples*	Always
Pixel Aspect Ratio	(0028,0034)	IS	*Aspect Ratio*	If aspect ratio is not '1\1'

Table 132: IMAGE PIXEL MODULE OF CREATED SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Number of Frames	(0028,0008)	IS	*1…n*	Always

Table 133: MULTI-FRAME MODULE OF CREATED SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Date of Secondary Capture	(0018,1012)	DA	*Date of image creation*	Always
Time of Secondary Capture	(0018,1014)	TM	*Time of image creation*	Always

Nominal Scanned Pixel Spacing	(0018,2010)	DS	*Physical distance on the media being digitized or scanned between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm.*	If original image was **not** calibrated to mm but specified an imager pixel spacing (0018,1164) or nominal scanned pixel spacing (0018,2010).
Pixel Spacing	(0028,0030)	DS	*Physical distance between the center of each pixel, specified by a numeric pair - adjacent row spacing (delimiter) adjacent column spacing in mm.*	If original image was calibrated to mm or specified an imager pixel spacing (0018,1164) or nominal scanned pixel spacing (0018,2010).
Pixel Spacing Calibration Type	(0028,0A02)	CS	FIDUCIAL	If image was manually calibrated.
Pixel Spacing Calibration Description	(0028,0A04)	LO	Manual Calibration	If image was manually calibrated.

Table 134: SC MODULE OF CREATED SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Burned In Annotation	(0028,0301)	CS	NO	Always
Frame Increment Pointer	(0028,0009)	AT	0020,0013 (Instance Number)	If 'Number of Frames' (0028,0008) = 1
			0018,1065 (Frame Time Vector)	If 'Number of Frames' (0028,0008) > 1

Table 135: SC MULTI-FRAME IMAGE MODULE OF CREATED SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Frame Time Vector	(0018,1065)	DS	*Array with real time increments in msec.*	If 'Frame Increment Pointer' (0028,0009) is present

Table 136: SC MULTI-FRAME VECTOR MODULE OF CREATED SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Specific Character Set	(0008,0005)	CS	ISO_IR 100	Always
SOP Class UID	(0008,0016)	UI	1.2.840.10008.5.1.4.1.1.7 (Secondary Capture Image) 1.2.840.10008.5.1.4.1.1.7.4 (Mulfi-frame True Color Secondary Capture Image)	Always
SOP Instance UID	(0008,0018)	UI	*New UID generated by Visage 7*	Always

Table 137: SOP COMMON MODULE OF CREATED SOP INSTANCE

8.1.2 Thick Slice Image IOD

Visage 7 can be configured to generate Thick Slice Images automatically from the Thin Slices received via STORAGE-SCP AE. Table 138 specifies the modules of the attributes copied from the source images that are modified by Visage 7. The Presence column gives information about the availabilty criteria of the particular module. All other modules that are inherited from the Thin Slices are not mentioned here.

IE	Module	Reference	Presence
Patient	Patient	Table 139	Always
Study	General Study	Table 140	Always
Series	General Series	Table 141	Always
Image	General Image	Table 142	Always
	Image Pixel	Table 143	Always
	Image Plane	Table 144	Always
	SOP Common	Table 145	Always

Table 138: IOD OF CREATED SOP INSTANCES

Table 139 - Table 146 specify the attribute presence of a Thick Slice Image that is created by Visage 7. The Presence column gives information about the availability criteria of the particular attribute. If the attributes presence is indicated as ‘Always’ and the value from the source image is used, the Thick Slice image will only be created if this attribute is present in the original image. All attributes which are not listed in the tables will be adopted from the source images.

Attribute Name	Tag	VR	Value	Presence
Patient's Name	(0010,0010)	PN	*Value from source images*	Always (maybe empty)
Patient ID	(0010,0020)	LO	*Value from source images*	Always (maybe empty)
Patient's Birth Date	(0010,0030)	DA	*Value from source images*	Always (maybe empty)
Patient's Sex	(0010,0040)	CS	*Value from source images*	Always (maybe empty)

Table 139: PATIENT MODULE OF CREATED THICK SLICE SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Study Instance UID	(0020,000D)	UI	*Value from source images*	Always
Study Date	(0008,0020)	DA	*Value from source images*	Always (maybe empty)
Study Time	(0008,0030)	TM	*Value from source images*	Always (maybe empty)
Referring Physicians Name	(0008,0090)	PN	*Value from source images*	Always (maybe empty)
Study ID	(0020,0010)	SH	*Value from source images*	Always (maybe empty)
Accession Number	(0008,0050)	SH	*Value from source images*	Always (maybe empty)

Table 140: GENERAL STUDY MODULE OF CREATED THICK SLICE SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Modality	(0008,0060)	CS	*Value from source images*	Always
Series Instance UID	(0020,000E)	UI	*New UID generated by Visage 7*	Always
Series Number	(0020,0011)	IS	*New ID generated by Visage 7*	Always
Series Description	(0008,103E)	LO	Thick Slice - *Value from source images is appended*	Always

Table 141: GENERAL SERIES MODULE OF CREATED THICK SLICE SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Instance Number	(0020,0013)	IS	1	Always
Image Type	(0008,0008)	CS	DERIVED\SECONDARY	Always
Content Date	(0008,0023)	DA	*Date of image creation*	Always
Content Time	(0008,0033)	TM	*Time of image creation*	Always
Derivation Description	(0008,2111)	ST	Thick Slice	Always

Table 142: GENERAL IMAGE MODULE OF CREATED THICK SLICE SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Samples per Pixel	(0028,0002)	US	*Value from source images*	Always
Photometric Interpretation	(0028,0004)	CS	*Value from source images*	Always
Planar Configuration	(0028,0006)	US	*Value from source images*	If ‘Samples per Pixel’ > 1
Rows	(0028,0010)	US	*Value from source images*	Always
Columns	(0028,0011)	US	*Value from source images*	Always
Bits Allocated	(0028,0100)	US	*Value from source images*	Always
Bits Stored	(0028,0101)	US	*Value from source images*	Always
High Bit	(0028,0102)	US	*Value from source images*	Always
Pixel Representation	(0028,0103)	US	*Value from source images*	Always
Pixel Data	(7FE0,0010)	OW	*Pixel samples*	Always

Table 143: IMAGE PIXEL MODULE OF CREATED THICK SLICE SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Slice Thickness	(0018, 0050)	DS	*New float value generated by Visage 7*	Always
Image Position (Patient)	(0020,0032)	DS	*New float values generated by Visage 7*	Always
Image Orientation (Patient)	(0020,0037)	DS	*Values from source images*	Always
Pixel Spacing	(0028,0030)	DS	*Values from source images*	Always

Table 144: IMAGE PLANE MODULE OF CREATED THICK SLICE SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
SOP Class UID	(0008,0016)	UI	*Value from source images*	Always
SOP Instance UID	(0008,0018)	UI	*New UID generated by Visage 7*	Always

Table 145: SOP COMMON MODULE OF CREATED THICK SLICE SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Private Creator	(0009,00AA)	LO	Mercury Visage	Always
Referring thin slice UID	(0009,AA10)	UI	*Series UID copied from source image*	Always

Table 146: PRIVATE MODULE OF CREATED THICK SLICE SOP INSTANCE

8.1.3 Reformatted MPR Image IOD

In Visage 7 it is possible to export Reformatted MPR images for 3D CT or MR volumes. Table 147 specifies the modules of the attributes copied from the source images that are modified by Visage 7. The Presence column gives information about the availabilty criteria of the particular module. All other modules that are inherited from the original image series are not mentioned here.

IE	Module	Reference	Presence
Patient	Patient	Table 148	Always
Study	General Study	Table 149	Always
Series	General Series	Table 150	Always
Image	General Image	Table 151	Always
	Image Pixel	Table 152	Always
	Image Plane	Table 153	Always
	SOP Common	Table 154	Always

Table 147: IOD OF CREATED SOP INSTANCES

Table 156 - Table 154 specify the attribute presence of a Reformatted MPR image that is created by Visage 7. The Presence column gives information about the availability criteria of the particular attribute. If the attributes presence is indicated as ‘Always’ and the value from the source image is used, the Reformatted MPR image will only be created if this attribute is present in the original image. All attributes which are not listed in the tables will be adopted from the source images.

Attribute Name	Tag	VR	Value	Presence
Patient's Name	(0010,0010)	PN	*Value from source images*	Always (maybe empty)
Patient ID	(0010,0020)	LO	*Value from source images*	Always (maybe empty)
Patient's Birth Date	(0010,0030)	DA	*Value from source images*	Always (maybe empty)
Patient's Sex	(0010,0040)	CS	*Value from source images*	Always (maybe empty)

Table 148: PATIENT MODULE OF CREATED REFORMATTED MPR SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Study Instance UID	(0020,000D)	UI	*Value from source images*	Always
Study Date	(0008,0020)	DA	*Value from source images*	Always (maybe empty)
Study Time	(0008,0030)	TM	*Value from source images*	Always (maybe empty)
Referring Physicians Name	(0008,0090)	PN	*Value from source images*	Always (maybe empty)
Study ID	(0020,0010)	SH	*Value from source images*	Always (maybe empty)
Accession Number	(0008,0050)	SH	*Value from source images*	Always (maybe empty)

Table 149: GENERAL STUDY MODULE OF CREATED REFORMATTED MPR SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Modality	(0008,0060)	CS	*Value from source images (CT or MR)*	Always
Series Instance UID	(0020,000E)	UI	*New UID generated by Visage 7*	Always
Series Number	(0020,0011)	IS	*New ID generated by Visage 7*	Always
Series Description	(0008,103E)	LO	Reformatted MPR - *Value from source images is appended*	Always

Table 150: GENERAL SERIES MODULE OF CREATED THICK SLICE SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Instance Number	(0020,0013)	IS	1	Always
Image Type	(0008,0008)	CS	DERIVED\SECONDARY	Always
Content Date	(0008,0023)	DA	*Date of image creation*	Always
Content Time	(0008,0033)	TM	*Time of image creation*	Always
Derivation Description	(0008,2111)	ST	Reformatted MPR	Always

Table 151: GENERAL IMAGE MODULE OF CREATED REFORMATTED MPR SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Samples per Pixel	(0028,0002)	US	*1*	Always
Photometric Interpretation	(0028,0004)	CS	*MONOCHROME2*	Always
Rows	(0028,0010)	US	*Depends on size of input image and definition of MPR planes*	Always
Columns	(0028,0011)	US	*Depends on size of input image and definition of MPR planes*	Always
Bits Allocated	(0028,0100)	US	*16*	Always
Bits Stored	(0028,0101)	US	*16*	Always
High Bit	(0028,0102)	US	*15*	Always
Pixel Representation	(0028,0103)	US	*0*	Always
Pixel Padding Value	(0028,0120)	US	*Value from source images (if available) or 0*	Always
Pixel Data	(7FE0,0010)	OW	*Pixel samples*	Always

Table 152: IMAGE PIXEL MODULE OF CREATED REFORMATTED MPR SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence
Slice Thickness	(0018, 0050)	DS	New float value generated by Visage 7	Always
Image Position (Patient)	(0020,0032)	DS	*New float values generated by Visage 7*	Always
Image Orientation (Patient)	(0020,0037)	DS	*New float values generated by Visage 7*	Always
Pixel Spacing	(0028,0030)	DS	*New float values generated by Visage 7*	Always

Table 153: IMAGE PLANE MODULE OF CREATED REFORMATTED MPR SOP INSTANCE

Attribute Name	Tag	VR	Value	Presence

SOP Class UID	(0008,0016)	UI	*Value from source images*	Always
SOP Instance UID	(0008,0018)	UI	*New UID generated by Visage 7*	Always

Table 154: SOP COMMON MODULE OF CREATED REFORMATTED MPR SOP INSTANCE

8.2 Supported Structured Report Attributes

Visage 7 can only display HTML Reports in the Report Viewer. Therefore Visage 7 converts Structured Report SOP Instances received via File Interface or STORAGE-SCP AE into HTML format. Additionally the objects are stored in the system in original DICOM format. The DICOM Objects for which the conversion process is performed are listed in the following table.

SOP Class Name	SOP Class UID
Basic Text Structured Reporting	1.2.840.10008.5.1.4.1.1.88.11
Enhanced Structured Reporting	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive Structured Reporting	1.2.840.10008.5.1.4.1.1.88.33

Table 155: SOP CLASSES USED FOR HTML REPORT GENERATION

Table 156 - Table 162 specify the modules and their attributes which are used from the Structured Report SOP Instances to create the Reports in HTML format. The presence in the HTML Report is guaranteed only for the information provided with the listed attributes.

Attribute Name	Tag	VR
Patient's Name	(0010,0010)	PN
Patient ID	(0010,0020)	LO
Patient's Birth Date	(0010,0030)	DA
Patient's Sex	(0010,0040)	CS

Table 156: SUPPORTED ATTRIBUTES OF PATIENT MODULE

Attribute Name	Tag	VR
Study Instance UID	(0020,000D)	UI
Study Date	(0008,0020)	DA
Study Time	(0008,0030)	TM
Referring Physicians Name	(0008,0090)	PN
Study ID	(0020,0010)	SH
Accession Number	(0008,0050)	SH
Study Description	(0008,1030)	LO

Table 157: SUPPORTED ATTRIBUTES OF GENERAL STUDY MODULE

Attribute Name	Tag	VR
Modality	(0008,0060)	CS
Series Instance UID	(0020,000E)	UI
Series Number	(0020,0011)	IS

Table 158: SUPPORTED ATTRIBUTES OF SR DOCUMENT SERIES MODULE

Attribute Name	Tag	VR
Manufacturer	(0008,0070)	LO

Table 159: SUPPORTED ATTRIBUTES OF GENERAL EQUIPMENT MODULE

Attribute Name	Tag	VR
Instance Number	(0020,0013)	IS
Content Date	(0008,0023)	DA
Content Time	(0008,0033)	TM

Table 160: SUPPORTED ATTRIBUTES OF SR DOCUMENT GENERAL MODULE

Attribute Name	Tag	VR
SOP Class UID	(0008,0016)	UI
SOP Instance UID	(0008,0018)	UI
Specific Character Set	(0008,0005)	CS
Instance Creation Date	(0008,0012)	DA
Instance Creation Time	(0008,0013)	TM
Instance Creator UID	(0008,0014)	UI
Coding Scheme Identification Sequence	(0008,0110)	SQ
> Coding Scheme Designator	(0008,0102)	SH
> Coding Scheme Registry	(0008,0112)	LO
> Coding Scheme External ID	(0008,0114)	ST
> Coding Scheme Name	(0008,0115)	ST
> Responsible Organization	(0008,0116)	ST

Table 161: SUPPORTED ATTRIBUTES OF SOP COMMON MODULE

Attribute Name	Tag	VR
Value Type: PNAME		
Content Sequence	(0040,A730)	SQ
> Relationship Type	(0040,A010)	CS
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
> Person Name	(0040,A123)	PN
Value Type: UIDREF		
Content Sequence	(0040,A730)	SQ
> Relationship Type	(0040,A010)	CS
> Observation Date Time	(0040,A032)	DT
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ

>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
> UID	(0040,A124)	UI
Value Type: SCOORD		
Content Sequence	(0040,A730)	SQ
> Relationship Type	(0040,A010)	CS
> Observation Date Time	(0040,A032)	DT
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
> Graphic Data	(0070,0022)	FL
> Graphic Type	(0070,0023)	CS
Value Type: TEXT		
Content Sequence	(0040,A730)	SQ
> Relationship Type	(0040,A010)	CS
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
> Text Value	(0040,A160)	UT
Value Type: TCOORD		
Content Sequence	(0040,A730)	SQ
> Relationship Type	(0040,A010)	CS
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
> Temporal Range Type	(0040,A130)	CS
> Referenced Time Offsets	(0040,A138)	DS
Value Type: COMPOSITE		
Content Sequence	(0040,A730)	SQ
> Referenced SOP Sequence	(0008,1199)	SQ
>> Referenced SOP Class UID	(0008,1150)	UI
>> Referenced SOP Instance UID	(0008,1155)	UI
> Relationship Type	(0040,A010)	CS
> Observation Date Time	(0040,A032)	DT
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
> Content Sequence including one or more Composite Objects		

Value Type: DATE		
Content Sequence	(0040,A730)	SQ
> Relationship Type	(0040,A010)	CS
> Observation Date Time	(0040,A032)	DT
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
> Date	(0040,A121)	DA
Value Type: DATETIME		
Content Sequence	(0040,A730)	SQ
> Relationship Type	(0040,A010)	CS
> Observation Date Time	(0040,A032)	DT
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
> DateTime	(0040,A120)	DT
Value Type: TIME		
Content Sequence	(0040,A730)	SQ
> Relationship Type	(0040,A010)	CS
> Observation Date Time	(0040,A032)	DT
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
> Time	(0040,A122)	TM
Value Type: IMAGE		
Content Sequence	(0040,A730)	SQ
> Referenced SOP Sequence	(0008,1199)	SQ
>> Referenced SOP Class UID	(0008,1150)	UI
>> Referenced SOP Instance UID	(0008,1155)	UI
>> Referenced Frame Number	(0008,1160)	IS
>> Referenced SOP Sequence	(0008,1199)	SQ
>>> Referenced SOP Class UID	(0008,1150)	UI
>>> Referenced SOP Instance UID	(0008,1155)	UI
> Relationship Type	(0040,A010)	CS
> Observation Date Time	(0040,A032)	DT
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
Value Type: CODE		

Content Sequence	(0040,A730)	SQ
> Relationship Type	(0040,A010)	CS
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
> Concept Code Sequence	(0040,A168)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
Value Type: NUM		
Content Sequence	(0040,A730)	SQ
> Relationship Type	(0040,A010)	CS
> Observation Date Time	(0040,A032)	DT
> Value Type	(0040,A040)	CS
>Concept Name Code Sequence	(0040,A043)	SQ
>> Code Value	(0008,0100)	SH
>> Coding Scheme Designator	(0008,0102)	SH
>> Code Meaning	(0008,0104)	LO
> Measured Value Sequence	(0040,A300)	SQ
>> Measurement Units Code Sequence	(0040,08EA)	SQ
>>> Code Value	(0008,0100)	SH
>>> Coding Scheme Designator	(0008,0102)	SH
>>> Code Meaning	(0008,0104)	LO
>> Numeric Value	(0040,A30A)	DS
Value Type: WAVEFORM		
Content Sequence	(0040,A730)	SQ
> Referenced SOP Sequence	(0008,1199)	SQ
>> Referenced SOP Class UID	(0008,1150)	UI
>> Referenced SOP Instance UID	(0008,1155)	UI
>> Referenced Waveform Channels	(0040,A0B0)	US
> Relationship Type	(0040,A010)	CS
> Value Type	(0040,A040)	CS

Table 162: SUPPORTED ATTRIBUTES OF SR DOCUMENT CONTENT MODULE