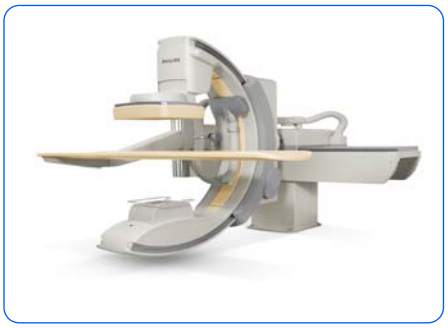
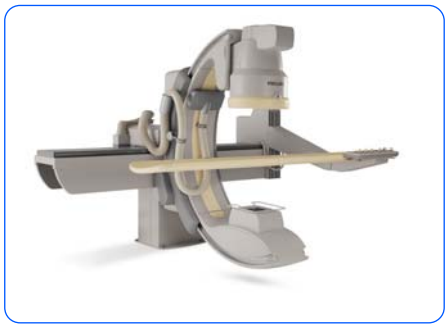
DICOM

Conformance Statement

MultiDiagnost Eleva R4.1





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1. DICOM CONFORMANCE STATEMENT OVERVIEW

The MultiDiagnost Eleva is a multifunctional X-ray system, designed to provide faster, more confident diagnoses. It combines a wide applicational range with revolutionary Eleva technology that adapts the system to your way of working. When equipped with Philips' latest dynamic Flat Detector it provides excellent image quality at the lowest possible dose.

The MultiDiagnost Eleva system is a Digital Fluorography modality. Depending on the purchased options and chosen configuration, the MultiDiagnost Eleva system provides the following DICOM data exchange features:

- Request worklist;
- Issue procedure information to RIS/HIS system;
- Image acquisition and display;
- Image review and processing;
- Image handling, storage and networking;
- Administration of patient, physician and examination data;
- Read and Write DICOM CD-RW disks;
- Read and write DICOM DVD-RW disks;
- It allows the operator to print images stored in the database on a DICOM printer;
- Copy images from the local database to remote databases and vice versa;
- Import images for viewing;
- Storage commitment function;
- It allows a remote system to query the MultiDiagnost Eleva system database and to retrieve images from it;
- Sends out images either as raw data or as processed data.

The main application areas are:

- R/F examinations;
- Vascular examinations;
- Interventional procedures.

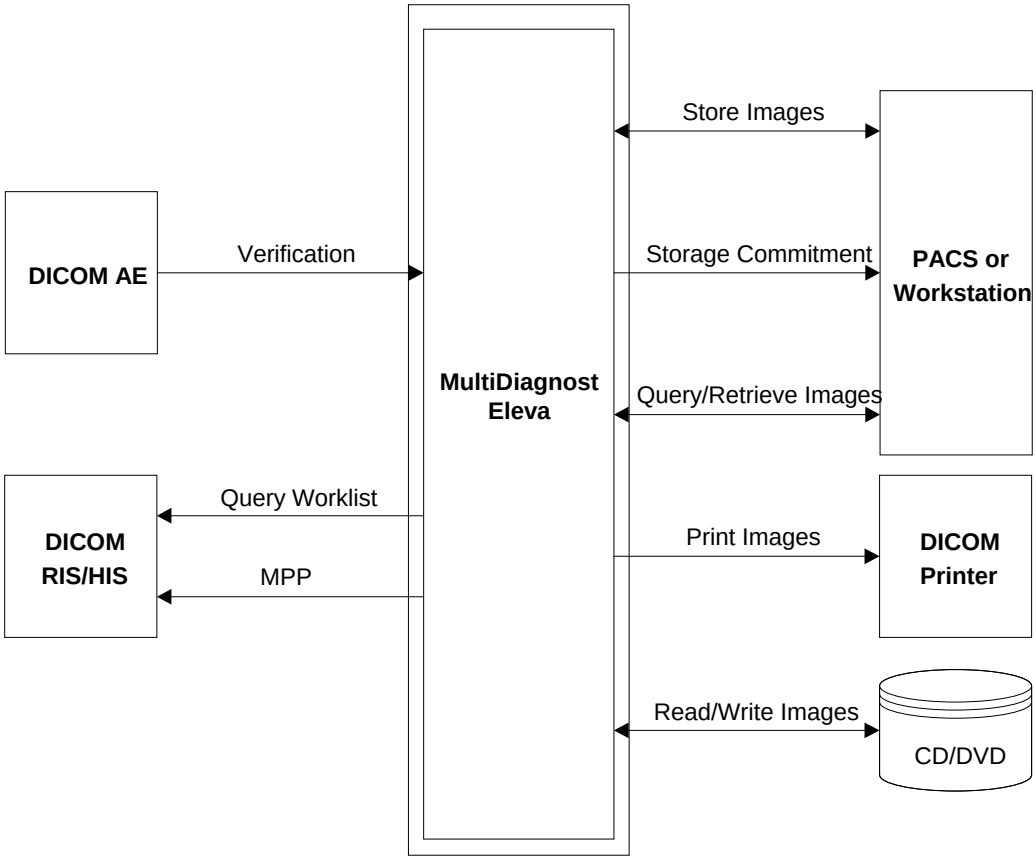

Figure 1: MultiDiagnost Eleva in a DICOM Network environment

MultiDiagnost Eleva allows the operator also to view, analyze and process the images stored in the database. Some advanced analysis and processing applications are primarily designed for images generated by Philips equipment when sent to the MultiDiagnost Eleva.

Disclaimer:
It is not the intention of the implementation to export imported images.

The following table presents an overview of all network services and the applicable SOP classes as provided by the MultiDiagnost Eleva.

Table 1: Network Services

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	**UID**		
Transfer			
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	**UID**		
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes
Specialized PMS X-Ray Image Store	1.3.46.670589.2.3.1.1	Yes	Yes
XA Reconstructed X-Ray	1.3.46.670589.2.4.1.1	Yes	Yes
3D Volume Storage	1.3.46.670589.5.0.1.1	Yes	Yes
3D Object Storage	1.3.46.670589.5.0.2.1	Yes	Yes
Surface Storage	1.3.46.670589.5.0.3.1	Yes	Yes
Cardio Image Storage	1.3.46.670589.5.0.8.1	Yes	Yes
CT Synthetic Image Storage	1.3.46.670589.5.0.9	Yes	Yes
MR Synthetic Image Storage	1.3.46.670589.5.0.10	Yes	Yes
MR Cardio Analysis Storage	1.3.46.670589.5.0.11.1	Yes	Yes
CX Synthetic Image Storage	1.3.46.670589.5.0.12	Yes	Yes
Perfusion	1.3.46.670589.5.0.13	Yes	Yes
Perfusion Image Storage	1.3.46.670589.5.0.14	Yes	Yes
Query/Retrieve			
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	Yes
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes
Patient/Study Only Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.3.1	Yes	Yes
Patient/Study Only Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.3.2	Yes	Yes
Workflow Management			
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No
Print Management			
Basic Grayscale Print Management (Meta)	1.2.840.10008.5.1.1.9	Yes	No
- 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
Basic Color Print Management (Meta)	1.2.840.10008.5.1.1.18	Yes	No
- 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
Presentation LUT	1.2.840.10008.5.1.1.23	Yes	No

Note that the list of supported SOP classes is configurable.

The following table lists the supported media storage application profiles (with roles).

Table 2: Media Services

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk – Recordable		
General Purpose CD-R Interchange	Yes	Yes
DVD		
General Purpose DVD Interchange with JPEG*	Yes	Yes

** Only DVD+R(W), and without JPEG.*

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3. INTRODUCTION

The introduction specifies product and relevant disclaimers as well as any general information that the vendor feels is appropriate.

3.1. Revision History

The revision history provides dates and differences of the different releases.

Table 3: Revision History

Document Version	Date of Issue	Author	Description
1.0	19 June 2007	PMS C&S IC2	Final version of the DICOM Conformance Statement for MultiDiagnost Eleva R4.1.
1.1	22 June 2007	PMS C&S IC2	Update on converted X-Ray Radiofluoroscopic Image Storage SOP instances.

3.2. Audience

This DICOM Conformance Statement is intended for:

- (potential) customers
- system integrators of medical equipment
- marketing staff interested in system functionality
- software designers implementing DICOM interfaces

It is assumed that the reader is familiar with the DICOM standard.

3.3. Remarks

The DICOM Conformance Statement is contained in chapter 4 through 8 and follows the contents and structuring requirements of DICOM PS 3.2.

This DICOM Conformance Statement by itself does not guarantee successful interoperability of Philips equipment with non-Philips equipment. The user (or user's agent) should be aware of the following issues:

- **Interoperability**
  Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into an IT environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment.
  It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.

- **Validation**
  Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.
  Where Philips equipment is linked to non-Philips equipment, the first step is to

compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- **New versions of the DICOM Standard**
  The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery.
  The user should ensure that any non-Philips provider linking to Philips equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

3.4. Definitions, Terms and Abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see [DICOM] PS 3.3 and PS 3.4.
The word Philips in this document refers to Philips Medical Systems.
The word Eleva in this document refers to MultiDiagnost Eleva R4.1.

The following terms are used in this document:

Image Archive (PACS)
A system that provides long term storage of images, presentation states, key image notes and evidence documents [IHE].

Image Display Viewer
A system that offers capabilities for browsing patient studies. In addition, it may support the retrieval and display of selected sets of images, presentation states, key image notes, and evidence documents [IHE].

Department System Scheduler
A department based information system that provides functions related to the management of orders received from external systems or through the department system's user interface. Upon a defined workflow action, makes procedures available for charge posting. The actor defines the action/event that actually causes charges to post [IHE].

Performed Procedure Step Manager
A system that re-distribute the Modality Performed Procedure Step Information from the Acquisition Modality or image Creator to the Department System Scheduler/Order Filler and Image Manager [IHE].

Printer
A system that accepts and processes DICOM print requests as a DICOM Print SCP and performs image rendering on hardcopy media. The system must support pixel rendering according to the DICOM Grayscale Standard Display Function [IHE].

The following acronyms and abbreviations may be used in this document.

ACC American College of Cardiology

ACP	Archiving/Connectivity and Print
ACR	American College of Radiology
AE	Application Entity
BWLM	Basic Worklist Management (Service)
CD	Compact Disc
CD-R	CD-Recordable
CD-RW	CD-Rewritable
CR	Computed Radiography
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DVD	Digital Versatile Disc
DX	Digital X-Ray
EBE	DICOM Explicit VR Big Endian
ELE	DICOM Explicit VR Little Endian
EPX	Examination / Patient type / X-ray operator
FSC	File-set Creator
FSR	File-set Reader
FSU	File-set Updater
GUI	Graphic User Interface
HIS	Hospital Information System
ILE	DICOM Implicit VR Little Endian
IOD	Information Object Definition
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance
N/A	Not applicable
NEMA	National Electrical Manufacturers Association
NM	Nuclear Medicine
PDU	Protocol Data Unit
PR	Presentation State
RF	X-Ray Radiofluoroscopic
RIS	Radiology Information System
RWA	Real-World Activity
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
US	Ultrasound
WLM	Worklist Management
XA	X-Ray Angiographic

3.5. References

[DICOM] Digital Imaging and Communications in Medicine (DICOM), Part 1 – 18 (NEMA PS 3.1 – PS 3.18),
National Electrical Manufacturers Association (NEMA)
Publication Sales 1300 N. 17th Street, Suite 1847
Rosslyn, Virginia. 22209, United States of America

[IHE] Integrating the Healthcare Enterprise
(IHE) Technical Framework Revision 5.4:
Radiological Society of North America (RSNA), Inc.
820 Jorie Boulevard, Oak Brook, IL, United States of America

[VFRB] Release Bulletin ViewForum 4.2, 4522 981 33811, PMSN

4. NETWORKING

This section contains the networking related services (vs. the media related ones).

4.1. Implementation model

The implementation model consists of three sections:

- the application data flow diagram, specifying the relationship between the Application Entities and the “external world” or Real-World Activities,
- a functional description of each Application Entity, and
- the sequencing constraints among them.

4.1.1. Application Data Flow

The Eleva implements two application entities:

- RIS AE;
- ACP AE.

The following figure shows the networking application data flow as a functional overview of these application entities. On the left the local Real-World Activities are presented, whereas on the right the remote Real-World Activities are presented.

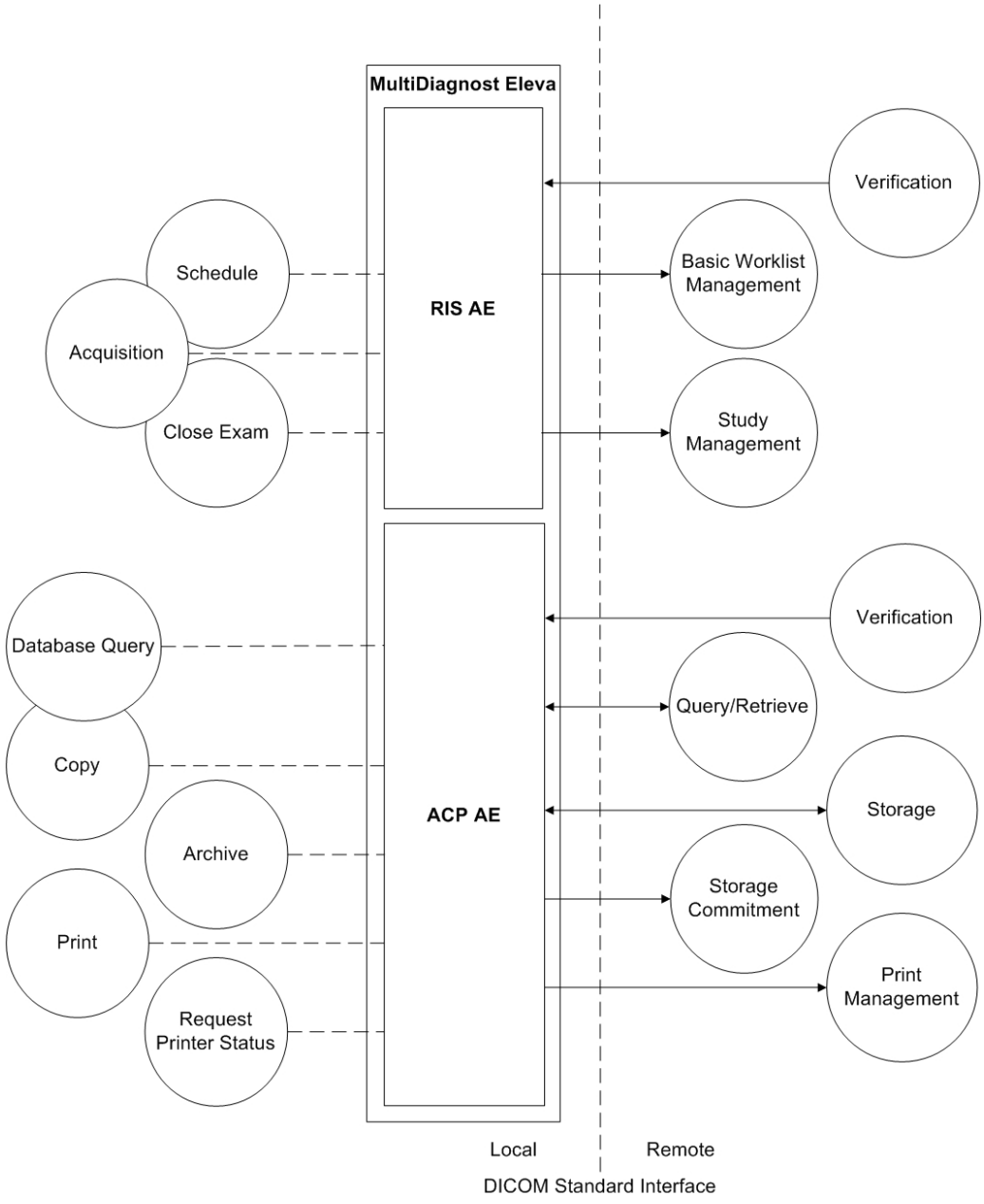

Figure 2: Application Data Flow Diagram

- The RIS AE incorporates the following functionality.

  For RWA Verification the Eleva as SCP provides standard Verification Service Class functionality to the requesting SCU.

  For RWA Schedule the Eleva as SCU uses the SCP Basic Worklist Management Service Class to query for the worklist.

  For RWA Acquisition the Eleva as SCU uses the SCP Study Management Service Class to create an MPPS record.

For RWA Close Exam the Eleva as SCU uses the SCP Study Management Service Class to complete the MPPS record.

- The ACP AE incorporates the following functionality.

  For RWA Verification the Eleva as SCP provides standard Verification Service Class functionality to the requesting SCU.

  For RWA Storage the Eleva as SCP provides standard Storage Service Class functionality to the requesting SCU.

  For RWA Query/Retrieve the Eleva as SCP provides standard Query/Retrieve Service Class functionality to the requesting SCU.

  For RWA Copy (triggered by either operator or RWA Query/Retrieve) the Eleva as SCU uses the SCP Storage Service Class functionality to store local images, or the SCP Query/Retrieve Service Class functionality to move remote images.

  For RWA Database Query the Eleva as SCU uses the SCP Query/Retrieve Service Class functionality to query images.

  For RWA Archive the Eleva as SCU uses the SCP Storage Service Class functionality to store local images and the SCP Storage Commitment Service Class functionality to commit these images.

  For RWA Print the Eleva as SCU uses the Print Management Service Class to print local images.

  For RWA Request Printer Status, the Eleva as SCU uses the Print Management Service Class to request the printer status.

4.1.2. Functional Definition of AE's

This part contains a functional definition for each individual local Application Entity, describing in general terms the functions to be performed by the AE and the DICOM services used to accomplish these functions.

4.1.2.1. Functional Definition of the RIS AE

The RIS AE will act as SCP for Verification (Verification), and will act as SCU for Basic Worklist Management (RIS Query) and Study Management (Acquisition). Initiated by the operator the RIS AE will propose the required presentation contexts for an association with the peer SCP.

4.1.2.2. Functional Definition of the ACP AE

The ACP AE will act as SCP for Verification (Verification), Storage (Import), and Query/Retrieve (Query; Retrieve). The ACP AE will act as SCU for Storage (Copy; Archive), Storage Commitment (Archive), Query/Retrieve (Database Query; Copy) and Print Management (Print; Request Printer Status).

4.1.3. Sequencing of Real World Activities

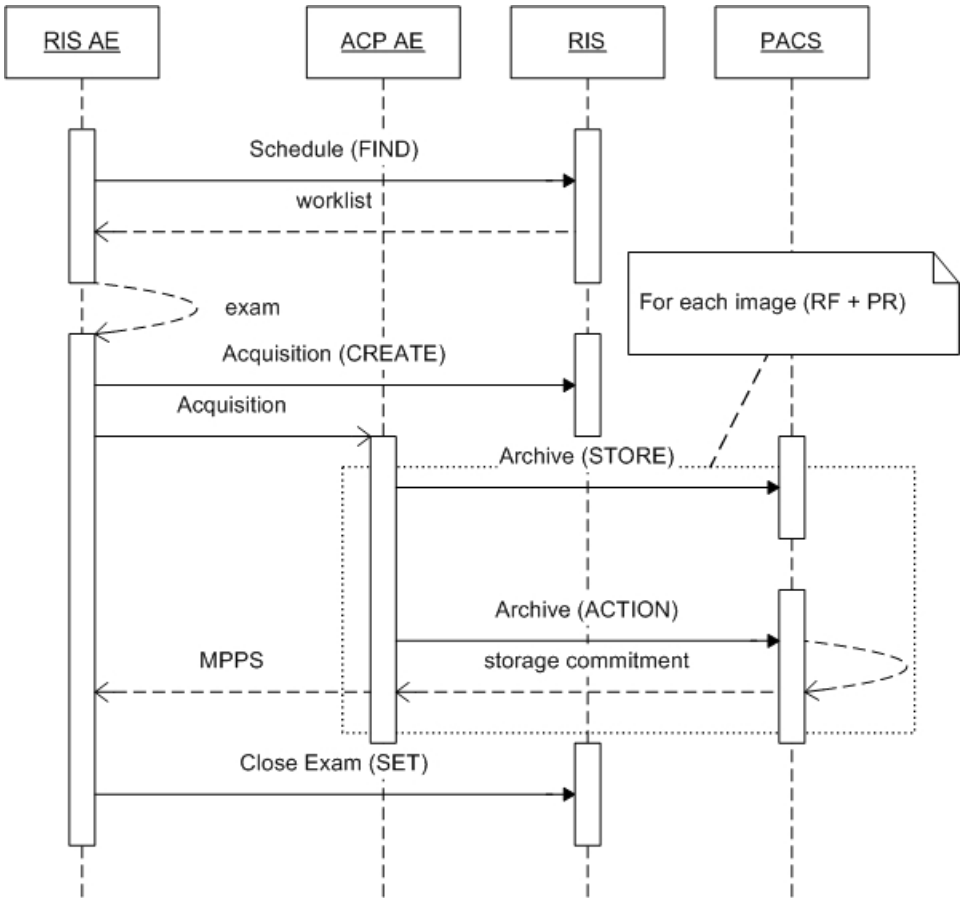

Figure 3: Sequencing of the Real-World Activities of the Eleva

The RIS AE can create an exam as result of a schedule (worklist or manual scheduling by clinical user). The clinical user can select an exam for acquisition. Once an acquisition has started, the MPPS CREATE message is sent from the RIS AE to the RIS. After each acquisition the exam and acquired image data are received by the ACP AE to view, export, or print.
Now the clinical user can archive the acquired images on a PACS; for each acquisition this includes storage of the image (and – if configured – presentation state) and – if configured – storage commitment. For each successful archive job the ACP AE will send the related MPPS data to the RIS AE.
Finally the clinical user can either close or discontinue the exam. As a result the RIS AE will send an MPPS SET message with status “COMPLETED” or “DISCONTINUED” to the RIS and remove the exam from the list.

4.2. AE Specifications

4.2.1. RIS AE

4.2.1.1. SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes.

Table 4: SOP Classes for the RIS AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	No	Yes
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No

4.2.1.2. Association Policies

This section describes the general association establishment and acceptance policies of the RIS AE.

4.2.1.2.1. General

The following DICOM standard application context is specified.

Table 5: DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2. Number of Associations

The number of simultaneous associations that an Application Entity may support as a SCU or SCP is specified.

Table 6: Number of Associations as an Association Initiator for the RIS AE

Maximum number of simultaneous associations	configurable

4.2.1.2.3. Asynchronous Nature

Not applicable.

4.2.1.2.4. Implementation Identifying Information

The following Implementation Class UID and Version Name are defined.

Table 7: DICOM Implementation Class and Version for the RIS AE

Implementation Class UID	1.3.46.670589.30.1.1
Implementation Version Name	PMS_ELEVA_PA_2.0

4.2.1.2.5. Communication Failure Handling

The behavior of the AE during communication failure is summarized in Table 8.

Table 8: Communication Failure Behavior

Exception	Behavior
ARTIM Timeout	The association is rejected. The reason is logged.

4.2.1.3. Association Initiation Policy

This section describes the conditions under which the AE will initiate an association.

The behavior of the AE during association rejection is summarized in Table 9.

Table 9: DICOM Association Rejection Handling

Result	Source	Reason/Diagnosis	Behavior
1 – rejected-permanent	1 – DICOM UL service-user	1 – no-reason-given	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 1: REJECT_SOURCE_dul_user, 1: REJECT_REASON _no_reason_given)
		2 – application-context-name-not-supported	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 1: REJECT_SOURCE_dul_user, 2: REJECT_REASON _application_context_not_support)
		3 – calling-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 1: REJECT_SOURCE_dul_user, 3: REJECT_REASON _calling_aetitle_not_recognized)
		7 – called-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 1: REJECT_SOURCE_dul_user, 7: REJECT_REASON _called_aetitle_not_recognized)
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established. The following error is logged. Error: UserRecoverable: impl.dicom.access.PEER: Associationrejected by peer (1: REJECT_RESULT _permanent, 2: REJECT_SOURCE _dul_provider (acse), 1: REJECT_REASON _no_reason_given)
		2 – protocol-version-not-supported	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 2: REJECT_SOURCE _dul_provider (acse), 2: REJECT_REASON _application_context_not_support)

Result	Source	Reason/Diagnosis	Behavior
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 3: REJECT_SOURCE _dul_provider (presentation), 1: REJECT_REASON _no_reason_given)
		2 – local-limit-exceeded	Association is not established. The following error is logged. Association rejected by peer (1: REJECT_RESULT _permanent, 3: REJECT_SOURCE _dul_provider (presentation), 2: REJECT_REASON _application_context_not_support)
2 – rejected-transient	1 – DICOM UL service-user	1 – no-reason-given	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 1: REJECT_REASON _no_reason_given)
		2 – application-context-name-not-supported	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 2: REJECT_REASON _application_context_not_support)
		3 – calling-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 3: REJECT_REASON _calling_aetitle_not_recognized)
		7 – called-AE-title-not-recognized	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 1: REJECT_SOURCE_dul_user, 7: REJECT_REASON _called_aetitle_not_recognized)
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 2: REJECT_SOURCE _dul_provider (acse), 1: REJECT_REASON _no_reason_given)
		2 – protocol-version-not-supported	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 2: REJECT_SOURCE _dul_provider (acse), 2: REJECT_REASON _application_context_not_support)

Result	Source	Reason/Diagnosis	Behavior
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 3: REJECT_SOURCE _dul_provider (presentation), 1: REJECT_REASON _no_reason_given)
		2 – local-limit-exceeded	Association is not established. The following error is logged. Association rejected by peer (2: REJECT_RESULT_transient, 3: REJECT_SOURCE _dul_provider (presentation), 2: REJECT_REASON _application_context_not_support)

The behavior of the AE on receiving an association abort is summarized in Table 10.

Table 10: DICOM Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	The Eleva terminates the connection with the following log: Association ABORTED by peer (0: ABORT_SOURCE_dul_user, 0: ABORT_REASON_not_specified).
2 – DICOM UL service-provider	0 – reason-not-specified	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 0: ABORT_REASON_not_specified).
	1 – unrecognized-PDU	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 1: ABORT_REASON_unrecognized_pdu).
	2 – unexpected-PDU	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 2: ABORT_REASON_unexpected_pdu).
	4 – unrecognized-PDU parameter	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 4: ABORT_REASON _unrecognized_pdu_parameter).
	5 – unexpected-PDU parameter	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 5: ABORT_REASON _unexpected_pdu_parameter).
	6 – invalid-PDU-parameter value	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 6: ABORT_REASON _invalid_pdu_parameter).

The behavior of the AE during DICOM communication failure is summarized in Table 11.

Table 11: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT and command marked as failed. The reason is logged and reported to the user.
Association aborted	The command is marked as failed. The reason is logged and reported to the user.

4.2.1.3.1. Examination Control

This activity comprises the following RWA's.

- Verification;
- Schedule;
- Acquisition;
- Close Exam.

4.2.1.3.1.1. Description and Sequencing of Activities

An examination is regarded equivalent to a DICOM procedure step. It is scheduled or manually entered before an acquisition is being performed.

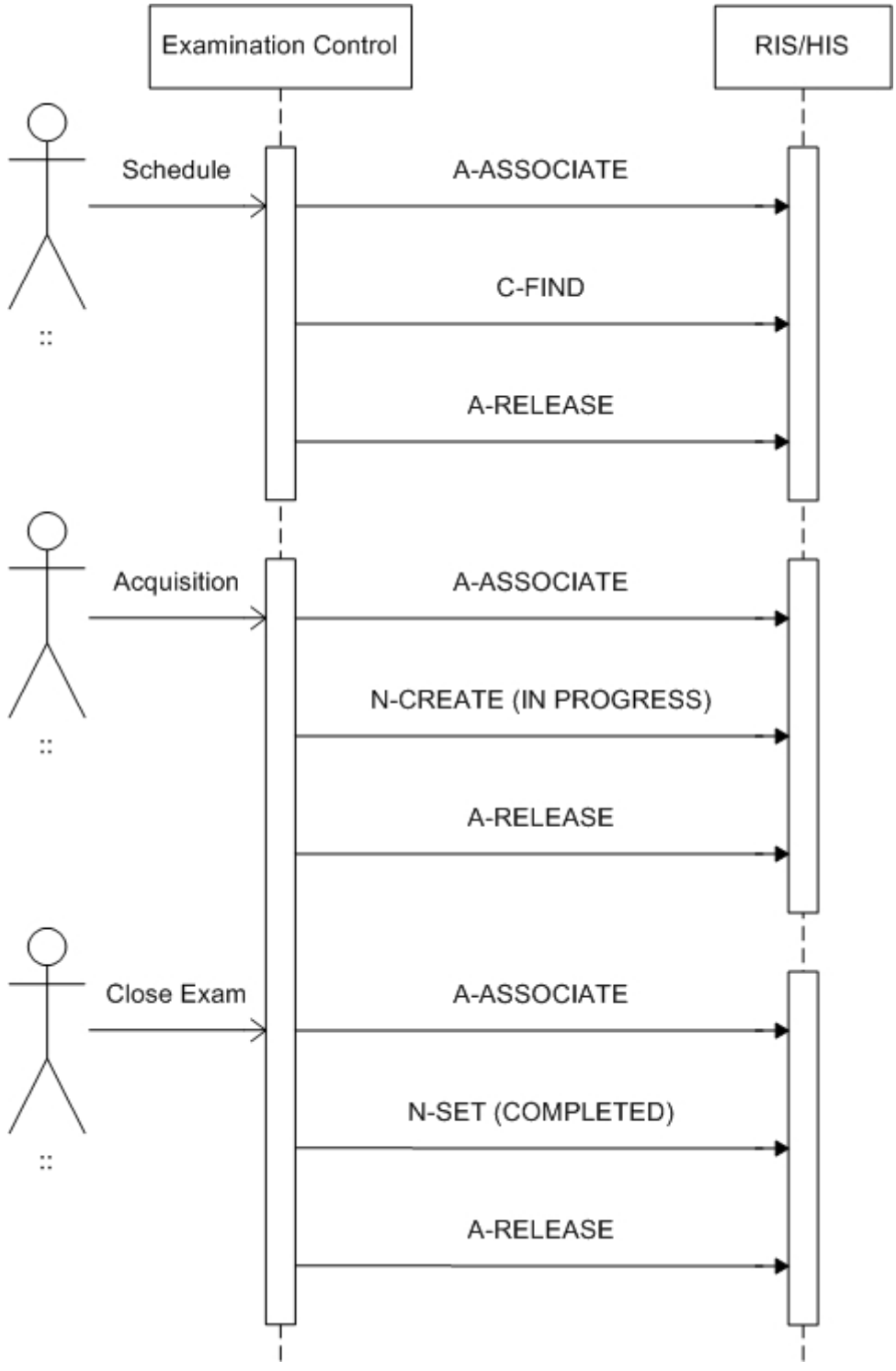

Figure 4: Sequencing of Examination Control

The RWA Schedule distinguishes two queries.

Broad query: At a configured time interval or after clicking the “RIS Query” button the RIS AE requests an association with the configured remote Basic Worklist Management SCP to perform a broad query. When the association is accepted the RIS AE sends the MWL query request

containing the configured matching key values. After the final response the RIS AE releases the association. The MWL query results are displayed in the patient list.

Patient query: After clicking the “Search RIS” button the operator may modify matching key values. When clicking the “Search now” button the RIS AE requests an association with the configured remote Basic Worklist Management SCP to perform a patient query. When the association is accepted the RIS AE sends the MWL query request containing the specified matching key values. After the final response the RIS AE releases the association. The MWL query results are displayed in the patient list.

The search option is typically triggered by the operator when a patient arrives at the system for examination.

Manually initiated queries can be cancelled by pressing the “Cancel” button on the user interface. In that case the DICOM association will be aborted immediately. As the query is performed asynchronously, intermediate results may be displayed in the mean time.

Now the operator may select a patient examination using the Assisted Acquisition Protocol Setting option.
The RIS AE by default derives the specific acquisition protocol from the Scheduled Protocol Code Sequence items. Furthermore the RIS AE supports 3 more configurable mapping relations. Thus the examination may be selected from:

- Scheduled Protocol Code items->Code Value (0040,0008) (default);
- Scheduled Procedure Step Description (0040,0007);
- Requested Procedure Code items->Code Value (0032,1064);
- Requested Procedure Description (0032,1060).

The RIS AE does not evaluate the attributes Coding Scheme Designator (0008,0102), Coding Scheme Version (0008,0103), Code Meaning (0008,0104), but only the Code Value (0008,0100) for mapping the examination settings. Consequently the RIS AE assumes that any used Code Value is unambiguous within the actual RIS domain.
The RIS AE has no limit for the number of items in the Scheduled Protocol Code Sequence.
Any single item results in one or more examinations (depending on the configured mapping). If a sequence contains more than one protocol code, these codes will be displayed as separate examinations on the UI but will be handled by one common MPPS instance.

When an examination is initiated the RIS AE will create an MPPS entry by sending the MPPS N-CREATE message with status IN PROGRESS to the RIS.
When an examination is performed the scheduled protocol code of the examination will be appended to the Performed Protocol Code Sequence of the MPPS.

Each time an acquisition is archived the RIS AE will keep a record of the related MPPS details. When the operator closes the exam the RIS AE will update the RIS by sending the MPPS N-SET message with status COMPLETED.

The operator may cancel an unclosed examination at any time. Depending on the state of the examination and MPPS related system configuration, the MPPS IN PROGRESS message already may have been sent (discontinued case) or not (abandoned case).

If not (abandoned case), the RIS AE first generates the MPPS N-CREATE IN PROGRESS message. In both cases the RIS AE sends the MPPS N-SET DISCONTINUED message.

4.2.1.3.1.2. Proposed Presentation Contexts

The presentation context proposed by the RIS AE is defined in Table 12.

Table 12: Proposed Presentation Contexts for the RIS AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Modality Worklist Information Model - FIND SOP Class	1.2.840.10008.5.1.4.31	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

Note: ELE is preferred Transfer Syntax

4.2.1.3.1.3. SOP Specific Conformance for SOP Classes

4.2.1.3.1.3.1. Basic Worklist Management

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 13.

Table 13: DICOM C-FIND Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Matching is complete	The worklist is updated.
Failure	A700	Refused – Out of resources	The association is released. The reason is logged.
	A900	Failed – Identifier does not match SOP class	The association is released. The reason is logged.
	Cxxx	Failed – Unable to process	The association is released. The reason is logged.
Cancel	FE00	Matching terminated due to Cancel request	The association is released. The reason is logged.
Pending	FF00	Matches are continuing – Current match is supplied and any optional keys were supported in the same manner as required keys	The MWL query job continues.

Service Status	Code	Further Meaning	Behavior
	FF01	Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier	The MWL query job continues.

When date matching is configured, the date value is continuously generated from local system time, including nightshift tolerance in the morning hours taking the schedule from “yesterday”.

If the query response contains inconsistent values then the query is retried. Then if the inconsistency still exists the RIS AE will send an A-ABORT with “reason-not-specified”.

The Table below provides a description of the RIS AE Worklist Request Identifier and specifies the attributes that are copied into the images.

Table 14: Worklist Request Identifier

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
SOP Common Module									
Specific Character Set	0008,0005	CS	X				X		Configurable.
Scheduled Procedure Step Module									
Scheduled Procedure Step Sequence	0040,0100	SQ		X					
>Modality	0008,0060	CS	X	X	X			Single Value, Universal	Modality. Configurable matching key values: “*”; “RF”; “XA”; “CR”; “DX”; “US”.
>Requested Contrast Agent	0032,1070	LO		X					
>Scheduled Station AE Title	0040,0001	AE	X	X	X			Single Value, Universal	Scheduled station. Optional matching key for broad query and patient query. For broad query configurable value: “ALL” or comma separated list of AET’s. Patient query may use wildcard. Note that any value other than Single Value results in Universal match being filtered internally.
>Scheduled Procedure Step Start Date	0040,0002	DA	X	X	X	X		Single Value, Universal	Date. Displayed until examination becomes in progress. Optional matching key for broad and patient query. For broad query configurable value: ”all”; “today”; “today + tomorrow”; “today + yesterday”; “today + yesterday + tomorrow”. For patient query value: ”all”; “today; “tomorrow”.

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
>Scheduled Procedure Step Start Time	0040,0003	TM		X		X			Time. Displayed until examination becomes in progress.
>Scheduled Procedure Step End Date	0040,0004	DA		X					
>Scheduled Procedure Step End Time	0040,0005	TM		X					
>Scheduled Performing Physician's Name	0040,0006	PN		X		X	X		Physician.
>Scheduled Procedure Step Description	0040,0007	LO		X		X	X		Description.
>Scheduled Protocol Code Sequence	0040,0008	SQ		X			X*		
>>Code Value	0008,0100	SH		X			X*		
>>Coding Scheme Designator	0008,0102	SH		X			X*		
>>Coding Scheme Version	0008,0103	SH		X					
>>Code Meaning	0008,0104	LO		X		X	X*		Meaning. Displayed for each item.
>Scheduled Procedure Step ID	0040,0009	SH		X			X		Configurable.
>Scheduled Station Name	0040,0010	SH		X					
>Scheduled Procedure Step Location	0040,0011	SH		X					
>Pre-Medication	0040,0012	LO		X					
>Scheduled Procedure Step Status	0040,0020	CS		X					
>Comments on the Scheduled Procedure Step	0040,0400	LT		X					
Requested Procedure Module									
Referenced Study Sequence	0008,1110	SQ		X			X		
>Referenced SOP Class UID	0008,1150	UI		X			X		
>Referenced SOP Instance UID	0008,1155	UI		X			X		
Study Instance UID	0020,000D	UI		X			X		
Requested Procedure Description	0032,1060	LO		X		X			Description.
Requested Procedure Code Sequence	0032,1064	SQ		X					
>Code Value	0008,0100	SH		X		X			Code.
>Coding Scheme Designator	0008,0102	SH		X					
>Coding Scheme Version	0008,0103	SH		X					
>Code Meaning	0008,0104	LO		X		X			Meaning.
Requested Procedure ID	0040,1001	SH		X	X	X	X	Single Value, Universal, WildCard	Request ID. Optional matching key for patient query.
Reason for the Requested Procedure	0040,1002	LO		X		C			Reason.
Requested Procedure Priority	0040,1003	SH		X		X			Priority.
Patient Transport Arrangements	0040,1004	LO		X		X			Patient transport.
Names of Intended Recipients of Results	0040,1010	PN		X		X			Recipients.
Requested Procedure Comments	0040,1400	LT		X		C			Comment.

Attribute Name	Tag	VR	M	R	Q	D	IOD	Type of Matching	Comment
Imaging Service Request Module									
Accession Number	0008,0050	SH		X	X	X	X	Single Value, Universal, WildCard	Accession No. Optional matching key for patient query.
Referring Physician's Name	0008,0090	PN		X		X	X		Referring physician.
Requesting Physician	0032,1032	PN		X		X			Requesting physician.
Requesting Service	0032,1033	LO		X		X			Requesting service.
Reason for the Imaging Service Request	0040,2001	LO		X		C			Reason.
Issue Date of Imaging Service Request	0040,2004	DA		X		X			Issuing date.
Imaging Service Request Comments	0040,2400	LT		X		C			Comment.
Visit Status Module									
Current Patient Location	0038,0300	LO		X					
Patient Identification Module									
Patient's Name	0010,0010	PN		X	X	X	X	Single Value, Universal, WildCard	Name. Optional matching key for patient query.
Patient ID	0010,0020	LO		X	X	X	X	Single Value, Universal, WildCard	Patient ID. Optional matching key for patient query.
Issuer of Patient ID	0010,0021	LO		X					
Other Patient IDs	0010,1000	LO		X		X			Other patient IDs.
Patient Demographic Module									
Patient's Birth Date	0010,0030	DA		X		X	X		Date of birth. Used to determine patient type.
Patient's Sex	0010,0040	CS		X		X	X		Gender.
Patient's Size	0010,1020	DS		X		X			Height. Used to determine patient type.
Patient's Weight	0010,1030	DS		X		X			Weight. Used to determine patient type.
Ethnic Group	0010,2160	SH		X		X			Ethnic group.
Patient Comments	0010,4000	LT		X		X			Comment.
Confidentiality Constraint on Patient Data Description	0040,3001	LO		X					
Patient Medical Module									
Medical Alerts	0010,2000	LO		X		X			Medical alerts.
Contrast Allergies	0010,2110	LO		X		X			Contrast allergies.
Additional Patient History	0010,21B0	LT		X		X			Additional patient history.
Pregnancy Status	0010,21C0	US		X		X			Pregnancy status.
Special Needs	0038,0050	LO		X					

* For II-TV systems only, not for FD.

The table should be read as follows:

Attribute Name: Attributes supported to build a Modality Worklist Request Identifier.
Tag: DICOM tag for this attribute.
VR: DICOM VR for this attribute.
M: Matching Keys for (automatic) worklist update.
R: Return Keys. An “X” will indicate that this attribute as return key with zero length for universal matching. A “C” indicates that this worklist attribute is configurable.

Q: Interactive Query Key. An “X” will indicate that this attribute can be used as matching key.
D: Displayed Keys. An “X” indicates that this worklist attribute is displayed to the user during a patient registration dialog. A “C” indicates that this worklist attribute is configurable.
IOD: An “X” indicates that this worklist attribute is included into all object instances created during performance of the related procedure step.
Type of matching: The following types of matching exist:

- List of UID Matching
- Range Matching
- Sequence Matching
- Single Value Matching
- Universal Matching
- Wild Card Matching

4.2.1.3.1.3.2. Study Management

If scheduled by the RIS, each examination is the result of one Scheduled Procedure Step. Since an exam may not be re-opened after having been closed, and each exam workflow context is enclosed in one MPPS, one exam may result in 0:1 MPPS instances. However, image archiving after the examination’s closure leads to 1:n MPPS instances per exam.

When the exam is initiated, at first acquisition the RIS AE generates an MPPS N-SET message with status IN PROGRESS. The RIS AE does not generate any intermediate MPPS IN PROGRESS messages for subsequent acquisitions of this examination. When closing the exam, the RIS AE generates an MPPS N-SET message with status COMPLETED. If the MPPS contains multiple examinations then the operator will be notified to confirm closure of current examination or all examinations. The exam cannot be reopened.
The RIS AE also generates MPPS messages for unscheduled exams.

Acquisition
All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 15.

Table 15: DICOM N-CREATE Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful operation	The SCP has successfully received the modality performed procedure step create request. Log entry.
Failure	0213	Resource limitation	The command is reported to the user as failed. The reason is logged. After a configured period of time the command will be retried up to a configured number of times.
	xxxx	(any other failure)	The command is reported to the user as failed. The reason is logged. No retry.

Table 16: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using AP-ABORT and command marked as failed. The reason is logged and reported to the user.
Association aborted	The command is marked as failed. The reason is logged and reported to the user.

Table 17: MPPS Request Identifiers for N-CREATE-RQ

Attribute Name	Tag	VR	Value	Comment
SOP Common Module				
Specific Character Set	0008,0005	CS	ISO_IR 100	
Performed Procedure Step Relationship Module				
Referenced Patient Sequence	0008,1120	SQ		Always empty.
Patient's Name	0010,0010	PN		Copied from MWL or entered by operator.
Patient ID	0010,0020	LO		Copied from MWL or entered by operator.
Patient's Birth Date	0010,0030	DA		Copied from MWL or entered by operator.
Patient's Sex	0010,0040	CS		Copied from MWL or entered by operator.
Scheduled Step Attribute Sequence	0040,0270	SQ		Copied from MWL.
>Accession Number	0008,0050	SH		
>Referenced Study Sequence	0008,1110	SQ		
>>Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.3.1.2.3.1	
>>Referenced SOP Instance UID	0008,1155	UI		
>Study Instance UID	0020,000D	UI		
>Requested Procedure Description	0032,1060	LO		
>Scheduled Procedure Step Description	0040,0007	LO		
>Scheduled Protocol Code Sequence	0040,0008	SQ		Contents copied from MWL.
>>Code Value	0008,0100	SH		
>>Coding Scheme Designator	0008,0102	SH		
>>Coding Scheme Version	0008,0103	SH		
>>Code Meaning	0008,0104	LO		
>Scheduled Procedure Step ID	0040,0009	SH		
>Requested Procedure ID	0040,1001	SH		
Performed Procedure Step Information Module				
Procedure Code Sequence	0008,1032	SQ		Contents copied from MWL Requested Procedure Code Sequence.
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
>Coding Scheme Version	0008,0103	SH		
>Code Meaning	0008,0104	LO		
Performed Station AE Title	0040,0241	AE		As configured.
Performed Station Name	0040,0242	SH		Always empty.
Performed Location	0040,0243	SH		Always empty.
Performed Procedure Step Start Date	0040,0244	DA		
Performed Procedure Step Start Time	0040,0245	TM		
Performed Procedure Step End Date	0040,0250	DA		Always empty.
Performed Procedure Step End Time	0040,0251	TM		Always empty.
Performed Procedure Step Status	0040,0252	CS	IN PROGRESS	

Attribute Name	Tag	VR	Value	Comment
Performed Procedure Step ID	0040,0253	SH		
Performed Procedure Step Description	0040,0254	LO		Copied from MWL.
Performed Procedure Type Description	0040,0255	LO		Always empty.
Image Acquisition Results Module				
Modality	0008,0060	CS	RF	
Study ID	0020,0010	SH		If scheduled then copied from Requested Procedure ID, else equipment generated study identifier.
Performed Protocol Code Sequence	0040,0260	SQ		Always empty.
Performed Series Sequence	0040,0340	SQ		Always empty.
Radiation Dose Module				
Image and Fluoroscopy Area Dose Product	0018,115E	DS		Not sent in case of appended MPPS instances.
Total Time of Fluoroscopy	0040,0300	US		Not sent in case of appended MPPS instances.
Total Number of Exposures	0040,0301	US		Not sent in case of appended MPPS instances.
Entrance Dose	0040,0302	US		Not sent in case of appended MPPS instances.
Exposure Dose Sequence	0040,030E	SQ		Not sent in case of appended MPPS instances.

Close Exam

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 18.

Table 18: DICOM N-SET Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful operation	The SCP has successfully received the modality performed procedure step set request. Log entry.
Failure	0110	Processing failure – performed procedure step object may no longer be updated	The reason is logged.
	xxxx	(any other failure)	The reason is logged.

Table 19: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using AP-ABORT and command marked as failed. The reason is logged and reported to the user.
Association aborted	The command is marked as failed. The reason is logged and reported to the user.

Table 20: MPPS Request Identifiers for N-SET-RQ

Attribute Name	Tag	VR	Value	Comment
Performed Procedure Step Information Module				
Procedure Code Sequence	0008,1032	SQ		Contents copied from MWL Requested Procedure Code Sequence.
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
>Coding Scheme Version	0008,0103	SH		
>Code Meaning	0008,0104	LO		
Performed Procedure Step End Date	0040,0250	DA		
Performed Procedure Step End Time	0040,0251	TM		
Performed Procedure Step Status	0040,0252	CS	COMPLETED, DISCONTINUED	
Performed Procedure Step Description	0040,0254	LO		Copied from MWL.
Image Acquisition Results Module				
Performed Protocol Code Sequence	0040,0260	SQ		All Scheduled Protocol Code Sequence items from MWL for which radiation has been released.
>Code Value	0008,0100	SH		
>Coding Scheme Designator	0008,0102	SH		
>Coding Scheme Version	0008,0103	SH		
>Code Meaning	0008,0104	LO		
Performed Series Sequence	0040,0340	SQ		One item per series or dummy value.
>Retrieve AE Title	0008,0054	AE		Always empty.
>Series Description	0008,103E	LO		Always empty.
>Performing Physician's Name	0008,1050	PN		The current physician as selected on DAM; default Scheduled Performing Physician's Name.
>Operators' Name	0008,1070	PN		
>Referenced Image Sequence	0008,1140	SQ		
>>Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.5.1.4.1.1.12.2	As exported by ACP AE.
>>Referenced SOP Instance UID	0008,1155	UI		As exported by ACP AE.
>Protocol Name	0018,1030	LO	unknown	
>Series Instance UID	0020,000E	UI		
>Referenced Non-Image Composite SOP Instance Sequence	0040,0220	SQ		
>>Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.5.1.4.1.1.11.1	As exported by ACP AE.
>>Referenced SOP Instance UID	0008,1155	UI		As exported by ACP AE.
Radiation Dose Module				
Image and Fluoroscopy Area Dose Product	0018,115E	DS		Not accumulating re-processed and non-digital images. Not sent in case of appended MPPS instances.

Attribute Name	Tag	VR	Value	Comment
Total Time of Fluoroscopy	0040,0300	US		Not sent in case of appended MPPS instances.
Total Number of Exposures	0040,0301	US		Not counting re-processed images. Not sent in case of appended MPPS instances.
Entrance Dose	0040,0302	US		Not sent in case of appended MPPS instances.
Exposure Dose Sequence	0040,030E	SQ		Limited to 400 elements.
>KVP	0018,0060	DS		
>Exposure Time	0018,1150	IS		
>Radiation Mode	0018,115A	CS	CONTINUOUS, PULSED	
>Filter Material	0018,7050	CS	ALUMINIUM, ALUMINIUM\COPPER	
>X-Ray Tube Current in uA	0018,8151	DS		

4.2.1.4. Association Acceptance Policy

This section describes the conditions under which the AE will accept an association.

The AE association rejection policies are summarized in Table 21.

Table 21: DICOM Association Rejection Policies

Result	Source	Reason/Diagnosis	Explanation
1 – rejected-permanent	1 – DICOM UL service-user	1 – no-reason-given	Association is not established due to any problem other than that specified in the rows below.
		2 – application-context-name-not-supported	An application context name other than 1.2.840.10008.3.1.1.1 is requested by the SCU during association.
		3 – calling-AE-title-not-recognized	The configuration does not contain a repository having the Calling AE Title as per the association request, or there is a problem in configuration (related to composing the configuration from the SCU and the SCP configuration).
		7 – called-AE-title-not-recognized	The called AE Title in the association request does not match the AE Title as per the configuration.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Not used.
		2 – protocol-version-not-supported	Not used.
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Not used.
		2 – local-limit-exceeded	Not used.
2 – rejected-transient	1 – DICOM UL service-user	1 – no-reason-given	Not used.
		2 – application-context-name-not-supported	Not used.
		3 – calling-AE-title-not-recognized	Not used.

Result	Source	Reason/Diagnosis	Explanation
		7 – called-AE-title-not-recognized	Not used.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Maximum number of associations is exceeded and an association request is received.
		2 – protocol-version-not-supported	Not used.
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Not used.
		2 – local-limit-exceeded	Not used.

The behavior of the AE for sending an association abort is summarized in Table 22.

Table 22: DICOM Association Abort Policies

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	Association times out due to inactivity Any other problem than ones specified in the rows below. (Examples: Problem while decoding the DICOM stream, Invalid request, Echo SCP was unable to send the Response to SCU, Error writing to SCU stream).
2 – DICOM UL service-provider	0 – reason-not-specified	-
	1 – unrecognized-PDU	An unrecognized PDU type is received.
	2 – unexpected-PDU	The received PDU type is not expected in the current state of connection.
	4 – unrecognized-PDU parameter	An unrecognized Associate PDU item is received.
	5 – unexpected-PDU parameter	One of the Associate PDU items is received more than once. One of the Associate PDU items is received unexpectedly.
	6 – invalid-PDU-parameter value	One of the Associate PDU items is received more than once. One of the Associate PDU items is not received. Empty Called AE Title String (space-only) is received. Empty Calling AE Title String (space-only) is received. Unknown abstract syntax is received The length or the format of the received PDU item is invalid.

The behavior of the AE on receiving an association abort is summarized in Table 23.

Table 23: DICOM Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	The Eleva terminates the connection with the following log: Association ABORTED by peer (0: ABORT_SOURCE_dul_user, 0: ABORT_REASON_not_specified).
2 – DICOM UL service-provider	0 – reason-not-specified	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 0: ABORT_REASON_not_specified)

Source	Reason/Diagnosis	Behavior
	1 – unrecognized-PDU	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 1: ABORT_REASON_unrecognized_pdu).
	2 – unexpected-PDU	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 2: ABORT_REASON_unexpected_pdu).
	4 – unrecognized-PDU parameter	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 4: ABORT_REASON _unrecognized_pdu_parameter).
	5 – unexpected-PDU parameter	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 5: ABORT_REASON _unexpected_pdu_parameter).
	6 – invalid-PDU-parameter value	The Eleva terminates the connection with the following log: Association ABORTED by peer (2: ABORT_SOURCE_dul_provider, 6: ABORT_REASON _invalid_pdu_parameter).

4.2.1.4.1. Verification

4.2.1.4.1.1. Description and Sequencing of Activities

The RIS AE accepts associations from systems that wish to verify application level communication using the C-ECHO command.

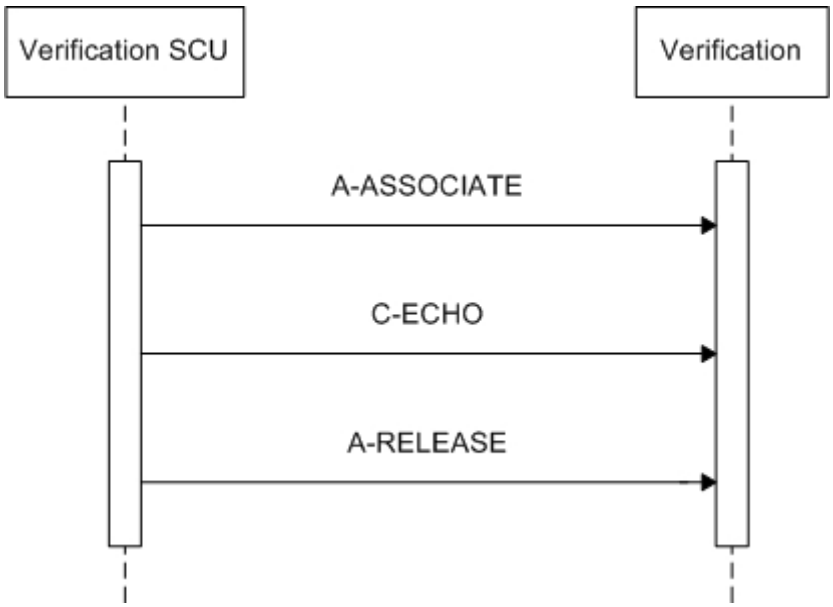

Figure 5: Sequencing of Verification

4.2.1.4.1.2. Accepted Presentation Contexts

The RIS AE is able to accept the presentation context as specified in the next table.

Table 24: Acceptable Presentation Context for Verification

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

For performance reasons the ELE transfer syntax is preferred and will be chosen in case multiple transfer syntaxes are proposed in the association negotiation.

The RIS AE accepts all contexts in the intersection of the proposed and acceptable presentation contexts. This means that the RIS AE accepts multiple proposed presentation contexts with the same SOP class but different transfer syntaxes. There is no check for duplicate contexts, and these will therefore be accepted.

4.2.1.4.1.3. SOP Specific Conformance for SOP Classes

The RIS AE provides standard conformance to the Verification service class.

The status behavior the RIS AE is as shown in Table 25.

Table 25: Verification C-ECHO Status Response

Service Status	Code	Further Meaning	Description
Success	0000	Verification is successful	The ACP AE is able to confirm application level communication.

4.2.2. ACP AE

4.2.2.1. SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes.

Table 26: SOP Classes for the ACP AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	No	Yes
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Yes	No
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No
>Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Yes	No
>Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Yes	No
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Yes	No
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No
>Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	Yes	No
>Printer SOP Class	1.2.840.10008.5.1.1.16	Yes	No
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	Yes	No
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
Digital X-Ray Image Storage - For Pres. SOP	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Yes	Yes
Patient Root Query/Retrieve Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes
Patient Root Query/Retrieve Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes
Study Root Query/Retrieve Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Yes	Yes
Study Root Query/Retrieve Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes
Patient/Study Only Query/Retrieve Info. Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.3.1	Yes	Yes
Patient/Study Only Query/Retrieve Info. Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.3.2	Yes	Yes
Specialized PMS X-Ray Image Store	1.3.46.670589.2.3.1.1	Yes	Yes
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	Yes	Yes
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1	Yes	Yes
3D Object new Storage (Private)	1.3.46.670589.5.0.2.1	Yes	Yes
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	Yes	Yes
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	Yes	Yes
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	Yes	Yes
MR Synthetic Image Storage (Private)	1.3.46.670589.5.0.10	Yes	Yes

SOP Class Name	SOP Class UID	SCU	SCP
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	Yes	Yes
CX Synthetic Image Storage (Private)	1.3.46.670589.5.0.12	Yes	Yes
Perfusion (Private)	1.3.46.670589.5.0.13	Yes	Yes
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	Yes	Yes

4.2.2.2. Association Policies

This section describes the general association establishment and acceptance policies of the ACP AE.

4.2.2.2.1. General

The following DICOM standard application context is specified.

Table 27: DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.2.2.2. Number of Associations

This section specifies the number of simultaneous associations supported by the ACP AE.

Table 28: Number of Associations as an Association Initiator for the ACP AE

Maximum number of simultaneous associations	Partly limited by UI and configuration – ref. note.

Note that local activities may result in at most 3 simultaneous associations: one association may be used to issue query requests, one association may be used to issue store or retrieve requests, and one association may be used for print requests. Furthermore, the ACP AE may initiate an association for each remote retrieve request, executed by the ACP AE as a C-MOVE operation. These associations are used to issue the C-STORE sub-operations implied by the retrieve requests. The number of simultaneous store associations for this retrieve purpose is principally not limited. The number of simultaneous associations for Storage Commitment is configurable.

Table 29: Number of Associations as an Association Acceptor for the ACP AE

Maximum number of simultaneous associations	configurable

Note that the number of simultaneous supported associations is determined by the available resources (CPU, memory, disk space).

4.2.2.2.3. Asynchronous Nature

The ACP AE does not support asynchronous operations and will not perform asynchronous window negotiation.

4.2.2.2.4. Implementation Identifying Information

The following Implementation Class UID and Version Name are defined.

Table 30: DICOM Implementation Class and Version for the ACP AE

Implementation Class UID	1.3.46.670589.5.2.23
Implementation Version Name	ViewForum R4.2

4.2.2.2.5. Communication Failure Handling

The behavior of the AE during communication failure is summarized in Table 31.

Table 31: Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	In case of association setup the job fails. The reason is logged and reported to the user.

4.2.2.3. Association Initiation Policy

This section describes the conditions under which the AE will initiate an association.

Note that during association negotiation the ACP AE will propose presentation context for all SOP classes as configured for the associated SCP.

4.2.2.3.1. Data Handling

This activity comprises the following RWA's.

- Archive;
- Database Query;
- Copy.

4.2.2.3.1.1. Description and Sequencing of Activities

The following figures show typical sequencing of Data Handling.

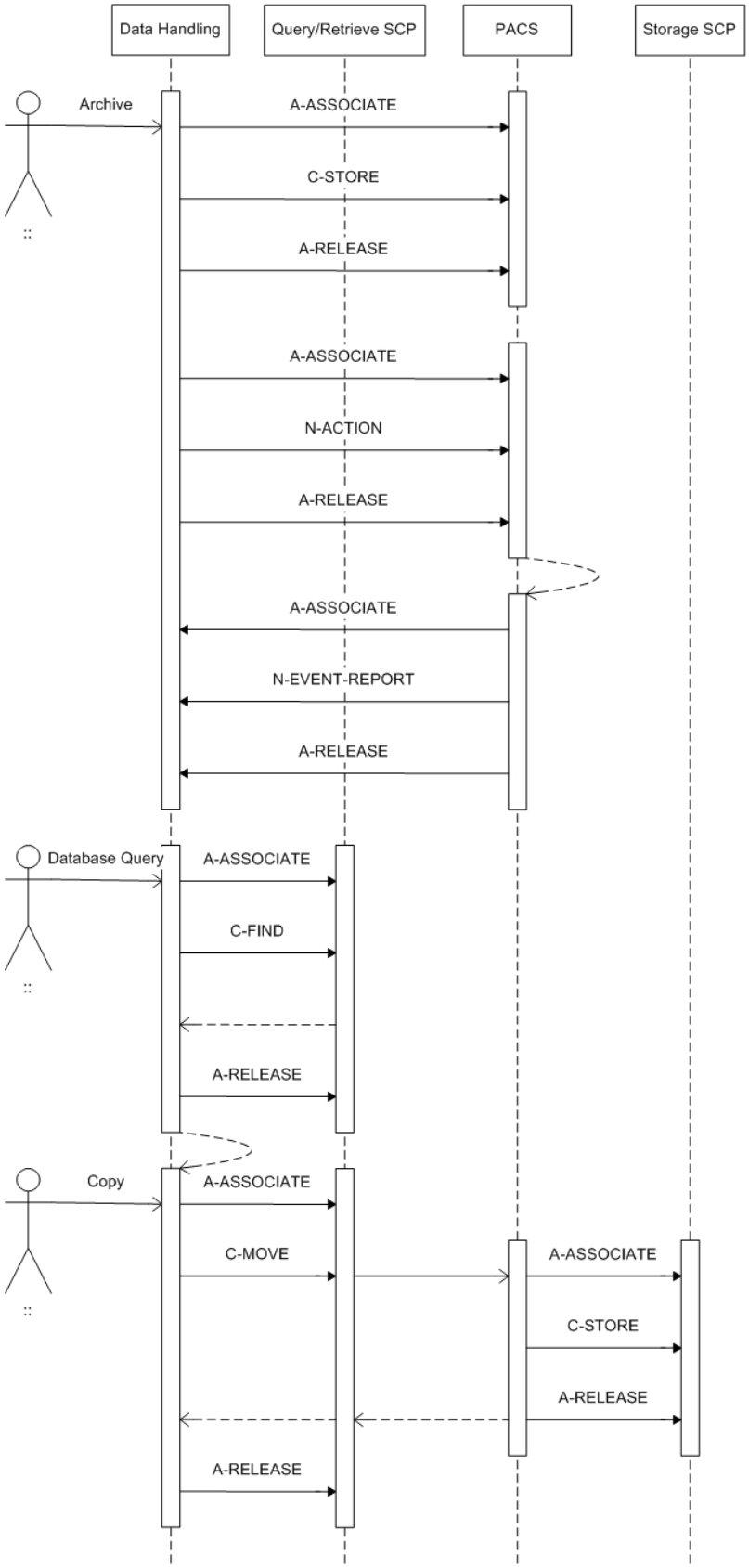

Figure 6: Sequencing of Data Handling (part 1)

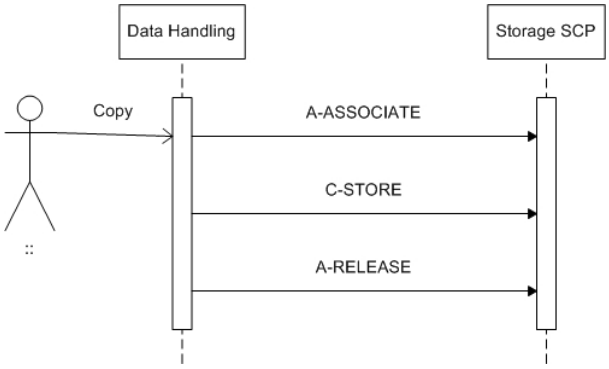

Figure 7: Sequencing of Data Handling (part 2)

The RWA Archive involves the storage and commitment of selected images, typically on a PACS (ref. Figure 6). The operator is able to archive the images selected in a patient folder from the local Eleva database. First the ACP AE initiates an association, stores the selected images from a patient, and releases the association. If storage commitment is configured, then the ACP AE initiates a new association, requests storage commitment for the stored images, and releases the association.
The storage commitment time-out can be configured for Eleva to support synchronous and/or asynchronous storage commitment event reporting.

The RWA Database Query involves the filtering of images in the selected database (ref. Figure 6). If the selected database is on a remote system, the ACP AE will use the Query/Retrieve service to show matching images in that database.
The ACP AE initiates an association to the selected peer entity and uses it to send Query (C-FIND) requests and receive the associated responses. The association is released when the query dialog is closed.

The RWA Copy involves the storage of images from one image database to another. There are three ways for the ACP AE to initiate the RWA Copy.

1. The operator is able to copy the images selected in a patient folder from the local Eleva database to another database (ref. Figure 7). For each selected patient the ACP AE initiates an association to the selected peer entity, and uses it to send C-STORE requests and receive the associated C-STORE responses. Each association is released when all selected images in the selected folder of the actual patient have been transmitted. The ACP AE handles the copy requests one after another.

2. The operator is able to copy the images selected in a patient folder from a remote database to another database (ref. Figure 6). For each selected patient the ACP AE initiates an association to the selected peer entity, uses it to send C-MOVE requests and receive the associated C-MOVE responses, and then releases the association. The ACP AE handles the copy requests one after another.

3. A remote application is able to copy images from the local Eleva database to another database by sending a C-MOVE request to the ACP AE. For each received retrieve request the ACP AE initiates an association to the requested move destination and uses it to send C-STORE requests and receive the associated C-STORE responses (ref. Figure 7). The association is released when all instances, i.e. images and presentation states as selected by the retrieve request identifier, have been stored. The ACP AE is able to simultaneously handle multiple C-MOVE requests.

The export of images can be done as raw data either as processed data, XA or RF.

Along with the image data the ACP AE also exports presentation state data. If the SCP supports the Grayscale Softcopy Presentation State storage SOP class then the applicable presentation state data will be transferred as such, otherwise the presentation state data will be merged with the image data before export. Please refer to section 8.1.4 Coerced/Modified fields, for more information on Presentation State storage.

4.2.2.3.1.2. Proposed Presentation Contexts

The presentation context proposed by the ACP AE is defined in Table 32.

Table 32: Proposed Presentation Contexts for ACP AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Any configured ACP AE specific Transfer and Query/Retrieve SOP class		ILE ELE EBE JPEG Baseline	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2 1.2.840.10008.1.2.4.50	SCU	None

Note that for performance reasons the ELE transfer syntax is preferred. Also note that JPEG Baseline is only supported for SOP instances with Photometric Interpretation of YBR_FULL_422.

4.2.2.3.1.3. SOP Specific Conformance for SOP Classes

4.2.2.3.1.3.1. Query/Retrieve C-FIND

The ACP AE will not generate queries containing optional keys. The ACP AE will not generate relational queries.

In the following table the supported query keys for each query level are described. Universal matching is supported as default.

Table 33: Supported Query Keys of the ACP AE

Attribute Name	Tag	VR	Type Of Matching	Comment
Query/Retrieve Level	0008,0052	CS	(Not applicable)	
Specific Character Set	0008,0005	CS	(Not applicable)	
Patient level				
Patient ID	0010,0020	LO	Universal, WildCard	Matching key
Patient's Name	0010,0010	PN	Universal, WildCard	Matching key
Patient's Birth Date	0010,0030	DA	Universal	
Patient's Sex	0010,0040	CS	Universal	
Study level				
Study Instance UID	0020,000D	UI	Universal	
Study Date	0008,0020	DA	Universal	
Study Time	0008,0030	TM	Universal	
Accession Number	0008,0050	SH	Universal	
Referring Physician's Name	0008,0090	PN	Universal	
Study Description	0008,1030	LO	Universal	
Study ID	0020,0010	SH	Universal	

Attribute Name	Tag	VR	Type Of Matching	Comment
Series level				
Series Instance UID	0020,000E	UI	Universal	
Modality	0008,0060	CS	Universal	
Series Number	0020,0011	IS	Universal	
Performing Physician's Name	0008,1050	PN	Universal	
Body Part Examined	0018,0015	CS	Universal	
Protocol Name	0018,1030	LO	Universal	
Performed Station Name	0040,0242	SH	Universal	
Performed Procedure Step Start Date	0040,0244	DA	Universal	
Performed Procedure Step ID	0040,0253	SH	Universal	
Performed Procedure Type Description	0040,0255	LO	Universal	
Composite Object Instance level				
SOP Instance UID	0008,0018	UI	Universal	
Instance Number	0020,0013	IS	Universal	
SOP Class UID	0008,0016	UI	Universal	
Content Date	0008,0023	DA	Universal	
Content Time	0008,0033	TM	Universal	

Do note that the query results screen will display all patients that have an empty Patient ID as one patient entry.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

Table 34: DICOM C-FIND Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Matching is complete	The SCP has successfully returned all matching information.
Failure	A700	Refused – Out of resources	No find results are displayed. The reason is logged.
	A900	Failed – Identifier does not match SOP class	No find results are displayed. The reason is logged.
	Cxxx	Failed – Unable to process	No find results are displayed. The reason is logged.
Cancel	FE00	Matching terminated due to Cancel Request	No find results are displayed. The reason is logged.
Pending	FF00	Matches are continuing – Current match is supplied and any optional keys were supported in the same manner as required keys	The find command continues.
	FF01	Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier	The find command continues.

Table 35: DICOM Command Communication Failure Behavior

Exception	Behavior
Reply time-out	The query fails and the association is aborted. The reason is logged and reported to the user.
Association time-out SCU	The association is released.
Association aborted	The query fails. The reason is logged and reported to the user.

4.2.2.3.1.3.2. Query/Retrieve C-MOVE

The ACP AE provides standard conformance.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

Table 36: DICOM C-MOVE Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Sub-operations complete – No Failures	The move job is marked as completed. The association is released.
Failure	A701	Refused – Out of resources: Unable to calculate number of matches	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	A702	Refused – Out of resources: Unable to perform sub-operations	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	A801	Refused – Move destination unknown	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	A900	Failed – Identifier does not match SOP class	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
	Cxxx	Failed – Unable to process	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
Warning	B000	Sub-operations complete – One or more failures	The move job is marked as completed. The association is released.
Cancel	FE00	Sub-operations terminated due to Cancel Indication	The move job is marked as failed. The association is released. The reason is logged and reported to the user.
Pending	FF00	Sub-operations are continuing	The move job continues.

Table 37: DICOM Command Communication Failure Behavior

Exception	Behavior
Reply time-out	The move job fails and the association is aborted. The reason is logged and reported to the user.
Association time-out SCU	Not applicable.
Association aborted	The move job fails. The reason is logged and reported to the user.

4.2.2.3.1.3.3. Storage

Important remarks about the exported images:

- In case the remote system does not support modality specific image storage SOP class, the ACP AE will convert the images (if configured to do so) and send them via the Secondary Capture image storage SOP class.
  These Secondary Capture images and additional information (like graphics, text and important attribute information) are burnt-in (if configured). The original bit depth of the Secondary Capture image is kept.
  Note: Only standard DICOM images can be converted; standard extended, specialized, and private SOP classes cannot be converted.
- A Specialized PMS X-Ray Image Store SOP instance may be converted into a standard DICOM X-Ray Radiofluoroscopic Image Storage SOP instance. When converting an image, the ACP AE will each time create a new SOP Instance UID; after export the converted image will be omitted and its UID will not reoccur on subsequent conversions.
- In case of color images, all color-coding schemes are sent as they were received.
- Attributes e.g. Study Date and Study Time will be added to images to be exported (if not yet present). This is done because there are imaging systems relying on the existence of these attributes.
- The ACP AE allows the operator to modify attributes of the stored images. ACP AE does not modify the pixel values of the stored images. Modified images retain their original Study, Series and Image UID.
- On the export of an imported image the ACP AE adds private attributes to the image.
- The exported ACP AE images do not contain Instance Number if the original images received from modalities do not contain this attribute or provide information in other attributes for ACP AE to generate it.
- Exported CT/MR images relate Scanogram and Slice images in the following way: Attribute 'Referenced Image Sequence' is present in the slice images and points to the related Scanogram image.
  Note that Attribute 'Frame of Reference UID' in the Scanogram (Localiser image) and related image slices are not guaranteed to be equal; this depends on the source of the images.
- For Secondary Capture images only one Window Width and Window Centre value is exported.
- Please refer to section 8.1.4 Coerced / Modified fields, for more information on stored images.
- When the location of a graphic or text annotation is specified relatively with regards to the displayed area. (i.e. DICOM attribute: Bounding Box Annotation Units, Anchor Point Annotation Units or Graphic Annotation Units equals “DISPLAY”), the annotation is not displayed.
- Areas occluded by Shutter are always black in ACP AE, whereas it is possible to want it to be white in DICOM.
- On the export of such an image the ACP AE first sets up an association to determine if the SCP supports the Grayscale Softcopy Presentation State SOP Class. If the SCP doesn't supports the Grayscale Softcopy Presentation State service the Graphical information is added to the image object additional a new instance UID is generated for this image.
- All kind of Images sending out, are included with Performed Procedure Step Tags like: (Start Date, Start Time, ID).

Use of optional, private and retired attributes

The transmitted Storage SOP instances may include all optional elements specified in the DICOM standard, depending on the source of the images.
The transmitted Storage SOP instances may contain Retired and Private data elements, depending on the source of the images and of the ACP AE configuration.

The ACP AE can convert the transfer syntax when exporting images. The ACP AE can implement transfer syntaxes according to the following table.

Table 38: Transfer Syntax Conversion

Syntax	Source	ILE	ELE	EBE	JPEG Baseline
Destination					
ILE		+	+	+	-
ELE		+	+	+	-
EBE		+	+	+	-
JPEG Baseline	*	+	+	+	-

* Notes:

- JPEG Baseline is only supported for images with Photometric Interpretation of YBR_FULL_422.
- As ACP AE internally stores the images in uncompressed format, the image data will be compressed to JPEG (RGB to YBR_FULL_422) before export.

The Store Response Status is saved in the log file; a user error will be displayed in the GUI.
The ACP AE will stop the transfer of the images and release the association as soon as it receives an unsuccessful Store Response Status.
In case that a remote application requested the transfer (by means of a C-MOVE request), a move response with status unsuccessful is sent to the retrieve requestor.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

Table 39: DICOM C-STORE Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Storage is complete	Continues with next store until completed. Then the store job is marked as completed and the association is released.
Failure	A7xx	Refused – Out of resources	The store job fails and the association is released. The reason is logged and reported to the user.
	A9xx	Error – Data set does not match SOP class	The store job fails and the association is released. The reason is logged and reported to the user.
	Cxxx	Error – Cannot understand	The store job fails and the association is released. The reason is logged and reported to the user.
Warning	B000	Coercion of data elements	Continues with next store until completed. Then the store job is marked as completed and the association is released.
	B006	Elements discarded	Continues with next store until completed. Then the store job is marked as completed and the association is released.
	B007	Data set does not match SOP class	Continues with next store until completed. Then the store job is marked as completed and the association is released.

Table 40: DICOM Command Communication Failure Behavior

Exception	Behavior
Reply time-out	The store job fails and the association is aborted. The reason is logged and reported to the user.
Association time-out SCU	The association is released.
Association aborted	The store job fails. The reason is logged and reported to the user.

4.2.2.3.1.3.4. Storage Commitment

The ACP AE provides standard conformance. For the ACP AE many remote nodes can be configured as Storage SCP. Each of those remote nodes can be configured to assign one Storage Commitment SCP for storage commitment.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

Table 41: DICOM N-ACTION Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Operation complete	Continues with waiting for storage commitment.
Failure	xxxx	(any failure)	The reason is logged.

The details regarding the response behavior for the Storage Commitment event report are detailed in section 4.2.2.4.4.

Table 42: DICOM Command Communication Failure Behavior

Exception	Behavior
Reply time-out	The association is released. Continues with waiting for storage commitment.
Association time-out SCU	The association is released. Continues with waiting for storage commitment.
Association aborted	Continues with waiting for storage commitment.

4.2.2.3.2. Printing

This activity comprises the following RWA's.

- Print;
- Request Printer Status.

4.2.2.3.2.1. Description and Sequencing of Activities

The following figure shows the typical sequencing of Printing.

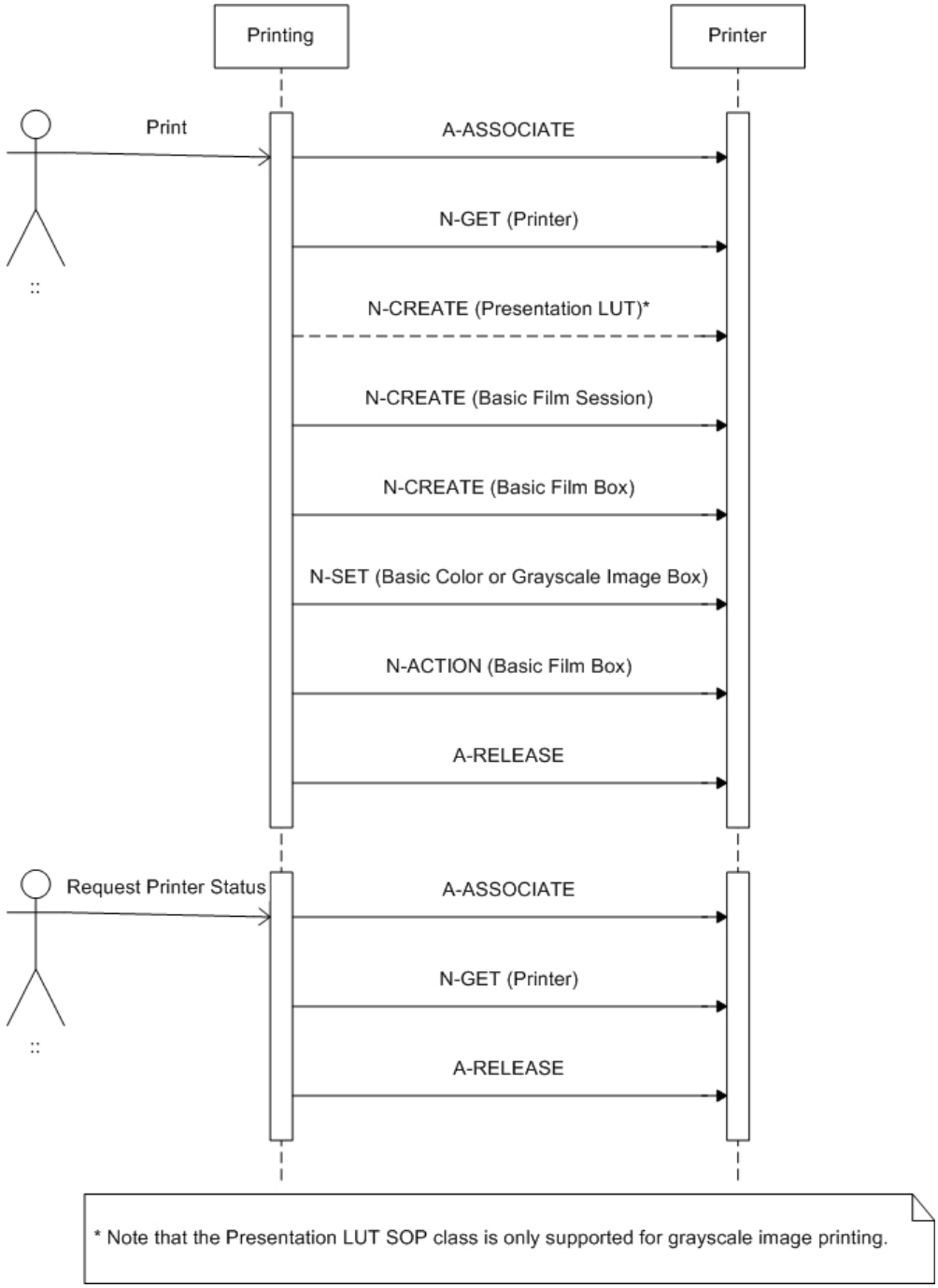

Figure 8: Sequencing of Printing

The RWA Print involves the printing of images by sending the selected images to a Print Management SCP (i.e. DICOM printer).
After selecting the print destination (from a list of configured printers) and some print parameters (depending on the configuration and the selected printer) the ACP AE initiates an association to the selected printer and uses it to send the print job.
The ACP AE also has an option for print preview.

The RWA Request Printer Status involves the request for the printer status of the configured printers. The ACP AE will periodically request the printer status. If an

association already exists for a print job (RWA Print) then the ACP AE uses this association, otherwise a new association will be initiated.

The status codes as returned by the printer are logged for service purposes and will not be shown on the GUI.
The Printer Status Tool may be used to reveal the received printer status.

4.2.2.3.2.2. Proposed Presentation Contexts

The presentation context proposed by the ACP AE is defined in Table 43.

Table 43: Proposed Presentation Contexts for ACP AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Basic Grayscale Print Management (Meta)	1.2.840.10008.5.1.1.9	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Basic Color Print Management (Meta)	1.2.840.10008.5.1.1.18	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Presentation LUT	1.2.840.10008.5.1.1.23	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

Note that for performance reasons the ELE transfer syntax is preferred.

4.2.2.3.2.3. SOP Specific Conformance for SOP Classes

4.2.2.3.2.3.1. Print Management

This section specifies the applicable IOD's for the Basic Grayscale Print Management Meta SOP class, the Basic Color Print Management Meta SOP class, and the Presentation LUT SOP class. Each sub-section describes one of the implemented SOP classes.

Table 44: DICOM Command Communication Failure Behavior

Exception	Behavior
Reply time-out	The association is released.
Association time-out SCU	The association is released.
Association aborted	The print job is marked as failed. The reason is logged and reported to the user.

The following abbreviations may be used in the module table "Presence of Value" specification.

ALWAYS The attribute is always present with a value;
ANAP The attribute is present under specified condition – if present then it will always have a value;
ANAPCV The attribute is present under specified condition – if present then its value is not always present (if attribute is present and condition on value does not apply then attribute sent zero length);

ANAPEV The attribute is present under specified condition – if present then it will not have any value (if attribute is present then sent zero length);
EMPTY The attribute is always present without any value (attribute sent zero length);
VNAP The attribute is always present and its value is not always present (if condition on value does not apply then attribute sent zero length)

The following abbreviations may be used in the module table “Source” specification.

AUTO The attribute value is generated automatically
CONFIG The attribute value source is a configurable parameter
COPY The attribute value source is another SOP instance
FIXED The attribute value is hard-coded in the application
IMPLICIT The attribute value source is a user-implicit setting
MPPS The attribute value source is a Modality Performed Procedure Step
MWL The attribute value source is a Modality Worklist
USER The attribute value source is explicit user input

Basic Film Session SOP class
The Printing process conforms to the Basic Film Session SOP class. The following DIMSE service element is supported: N-CREATE.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 45.

Table 45: DICOM Basic Film Session N-CREATE Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Film Session successfully created	The print job continues.
Warning	B600	Memory Allocation not supported	The print job continues and the warning is logged.

Table 46: DICOM Basic Film Session N-CREATE Modules

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Basic Film Session Presentation module						
Number of Copies	2000,0010	IS	1 to 99	ALWAYS	USER/ IMPLICIT	
Print Priority	2000,0020	CS	HIGH, LOW, MED	ALWAYS	IMPLICIT	
Medium Type	2000,0030	CS	BLUE FILM; CLEAR FILM; PAPER	ALWAYS	IMPLICIT	
Film Destination	2000,0040	CS	MAGAZINE; PROCESSOR	ALWAYS	IMPLICIT	
Film Session Label	2000,0050	LO	Philips Medical Systems	ALWAYS	FIXED	

Basic Film Box SOP class
The Printing process conforms to the Basic Film Box SOP class. The following DIMSE service elements are supported: N-ACTION; N-CREATE.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 47 and Table 48.

Table 47: DICOM Basic Film Box N-CREATE Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful operation	The print job continues.
Warning	B605	Requested Min Density or Max Density outside of printer's operating range	The print job continues and the warning is logged.
Failure	C616	There is an existing Film Box that has not been printed	The print job is marked as failed and the reason is logged.

Table 48: DICOM Basic Film Box N-ACTION Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Film accepted for printing	The print job continues.
Warning	B603	Film Box SOP Instance Hierarchy does not contain Image Box SOP instances	The print job continues and the warning is logged and reported to the user.
	B604	Image Size is larger than Image Box Size – the image has been de-magnified	The print job continues and the warning is logged and reported to the user.
	B609	Image Size is larger than Image Box Size – the image has been cropped to fit	The print job continues and the warning is logged and reported to the user.
	B60A	Image Size or combined Print Image Size is larger than Image Box Size – the image or combined print image has been decimated to fit	The print job continues and the warning is logged and reported to the user.
Failure	C602	Unable to create Print Job SOP instance – print queue is full	The print job is marked as failed and the reason is logged and reported to the user.
	C603	Image Size is larger than Image Box Size	The print job is marked as failed and the reason is logged and reported to the user.
	C613	Combined Print Image Size is larger than Image Box Size	The print job is marked as failed and the reason is logged and reported to the user.

Table 49: DICOM Basic Film Box N-CREATE Modules

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Basic Film Box Presentation module						
Image Display Format	2010,0010	ST	STANDARD\1,1; CUSTOM\1	ALWAYS	CONFIG	
Film Orientation	2010,0040	CS	PORTRAIT; LANDSCAPE	ALWAYS	CONFIG	
Film Size ID	2010,0050	CS	A; A3; A4; 8INX10IN; 8_5INX11IN; 10INX12IN; 10INX14IN; 11INX14IN; 11INX17IN; 14INX14IN; 14INX17IN; 24CMX24CM; 24CMX30CM	ALWAYS	CONFIG	
Magnification Type	2010,0060	CS		ALWAYS	USER	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Max Density	2010,0130	US		VNAP	CONFIG	
Trim	2010,0140	CS	NO; YES	VNAP	CONFIG	
Configuration Information	2010,0150	ST	L=1; L=V	ALWAYS	CONFIG	
Basic Film Box Relationship module						
Referenced Film Session Sequence	2010,0500	SQ		ALWAYS	AUTO	
>Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.5.1.1.1	ALWAYS	FIXED	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO	UID of parent Film Session
Referenced Presentation LUT Sequence	2050,0500	SQ		ANAP	AUTO	
> Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.5.1.1.23	ALWAYS	FIXED	
> Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO	UID of parent Presentation LUT

The N-ACTION DIMSE does not create any data set attributes.

Basic Grayscale Image Box SOP class
The Printing process conforms to the Basic Grayscale Image Box SOP class. The following DIMSE service elements are supported: N-SET.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 50.

Table 50: DICOM Basic Grayscale Image Box N-SET Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Image successfully stored in Image Box	The print job continues.
Warning	B604	Image Size is larger than Image Box Size – the image has been de-magnified	The print job continues and the warning is logged and reported to the user.
	B605	Requested Min Density or Max Density outside of printer's operating range	The print job continues and the warning is logged and reported to the user.
	B609	Image Size is larger than Image Box Size – the image has been cropped to fit	The print job continues and the warning is logged and reported to the user.
	B60A	Image Size or combined Print Image Size is larger than Image Box Size – the image or combined print image has been decimated to fit	The print job continues and the warning is logged and reported to the user.
Failure	C603	Image Size is larger than Image Box Size	The print job is marked as failed and the reason is logged and reported to the user.
	C605	Insufficient memory in printer to store the image	The print job is marked as failed and the reason is logged and reported to the user.

Service Status	Code	Further Meaning	Behavior
	C613	Combined Print Image Size is larger than Image Box Size	The print job is marked as failed and the reason is logged and reported to the user.

Table 51: DICOM Basic Grayscale Image Box N-SET Modules

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Box Pixel Presentation module						
Image Position	2020,0010	US	1	ALWAYS	FIXED	
Polarity	2020,0020	CS	NORMAL	ALWAYS	FIXED	
Basic Grayscale Image Sequence	2020,0110	SQ		ALWAYS	AUTO	
> Samples per Pixel	0028,0002	US	1	ALWAYS	FIXED	
> Photometric Interpretation	0028,0004	CS	MONOCHROME2	ALWAYS	FIXED	
> Rows	0028,0010	US		ALWAYS	COPY	
> Columns	0028,0011	US		ALWAYS	COPY	
> Bits Allocated	0028,0100	US	8; 16	ALWAYS	AUTO	
> Bits Stored	0028,0101	US	8; 12	ALWAYS	AUTO	
> High Bit	0028,0102	US	7; 11	ALWAYS	AUTO	
> Pixel Representation	0028,0103	US	0	ALWAYS	FIXED	
> Pixel Data	7FE0,0010	OB /O W		ALWAYS	AUTO	

Basic Color Image Box SOP class

The Printing process conforms to the Basic Color Image Box SOP class. The following DIMSE service elements are supported: N-SET.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 52.

Table 52: DICOM Basic Color Image Box N-SET Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Image successfully stored in Image Box	The print job continues.
Warning	B604	Image Size is larger than Image Box Size – the image has been de-magnified	The print job continues and the warning is logged and reported to the user.
	B605	Requested Min Density or Max Density outside of printer's operating range	The print job continues and the warning is logged and reported to the user.
	B609	Image Size is larger than Image Box Size – the image has been cropped to fit	The print job continues and the warning is logged and reported to the user.
	B60A	Image Size or combined Print Image Size is larger than Image Box Size – the image or combined print image has been decimated to fit	The print job continues and the warning is logged and reported to the user.

Service Status	Code	Further Meaning	Behavior
Failure	C603	Image Size is larger than Image Box Size	The print job is marked as failed and the reason is logged and reported to the user.
	C605	Insufficient memory in printer to store the image	The print job is marked as failed and the reason is logged and reported to the user.
	C613	Combined Print Image Size is larger than Image Box Size	The print job is marked as failed and the reason is logged and reported to the user.

Table 53: DICOM Basic Color Image Box N-SET Modules

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Box Pixel Presentation module						
Image Position	2020,0010	US	1	ALWAYS	FIXED	
Polarity	2020,0020	CS	NORMAL	ALWAYS	FIXED	
Basic Grayscale Image Sequence	2020,0110	SQ		ALWAYS	AUTO	
> Samples per Pixel	0028,0002	US	3	ALWAYS	FIXED	
> Photometric Interpretation	0028,0004	CS	RGB	ALWAYS	FIXED	
> Planar Configuration	0028,0006	US	0; 1	ALWAYS	COPY	
> Rows	0028,0010	US		ALWAYS	COPY	
> Columns	0028,0011	US		ALWAYS	COPY	
> Bits Allocated	0028,0100	US	8	ALWAYS	FIXED	
> Bits Stored	0028,0101	US	8	ALWAYS	FIXED	
> High Bit	0028,0102	US	7	ALWAYS	FIXED	
> Pixel Representation	0028,0103	US	0	ALWAYS	FIXED	
> Pixel Data	7FE0,0010	O W		ALWAYS	COPY	

Printer SOP class

The Printing process conforms to the Printer SOP Class. The following DIMSE service elements are supported: N-EVENT-REPORT; N-GET.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 54.

Table 54: DICOM Printer N-GET Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful operation	The print job continues.
Warning	xxxx	(any warning)	The print job continues and the warning is logged.
Failure	xxxx	(any failure)	The print job is marked as failed and the reason is logged and reported to the user.

Table 55: DICOM Printer N-EVENT-REPORT Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Successful operation	The print job is marked as completed.
Warning	xxxx	(any warning)	The print job continues and the warning is logged and reported to the user.
Failure	xxxx	(any failure)	The print job is marked as failed and the reason is logged and reported to the user.

Table 56: DICOM Printer N-GET Modules

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Printer module						
Manufacturer	0008,0070	LO		ANAPEV	FIXED	
Manufacturer's Model Name	0008,1090	LO		ANAPEV	FIXED	
Device Serial Number	0018,1000	LO		ANAPEV	FIXED	
Software Version(s)	0018,1020	LO		ANAPEV	FIXED	
Printer Status	2110,0010	CS		ANAPEV	FIXED	
Printer Status Info	2110,0020	CS		ANAPEV	FIXED	
Printer Name	2110,0030	LO		ANAPEV	FIXED	

Note that the ACP AE will ignore the contents of the N-EVENT-REPORT.

Presentation LUT SOP class
The Printing process conforms to the Presentation LUT SOP class. The following DIMSE service element is supported: N-CREATE.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 57.

Table 57: DICOM Presentation LUT N-GET Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Presentation LUT successfully created	The print job continues.
Warning	B605	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	The print job continues and the warning is logged.

Table 58: DICOM Presentation LUT N-CREATE Modules

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Presentation LUT module						
Presentation LUT Shape	2050,0020	CS	IDENTITY	ALWAYS	FIXED	

4.2.2.4. Association Acceptance Policy

This section describes the conditions under which the AE will accept an association.

The behavior of the AE during communication failure is summarized in Table 59.

Table 59: Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The reason is logged.

4.2.2.4.1. Verification

4.2.2.4.1.1. Description and Sequencing of Activities

The ACP AE accepts associations from systems that wish to verify application level communication using the C-ECHO command.

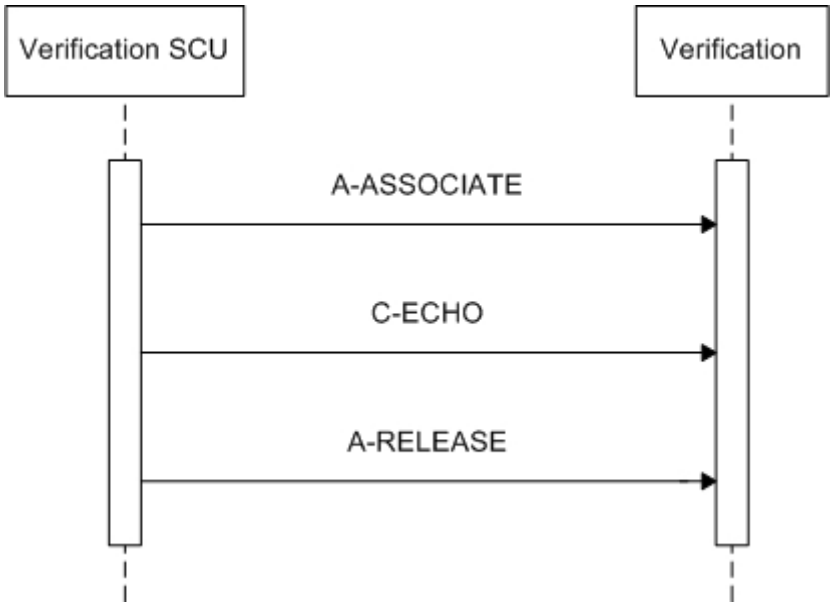

Figure 9: Sequencing of Verification

4.2.2.4.1.2. Accepted Presentation Contexts

The ACP AE is able to accept the presentation context as specified in the next table.

Table 60: Acceptable Presentation Context for Verification

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

For performance reasons the ELE transfer syntax is preferred and will be chosen in case multiple transfer syntaxes are proposed in the association negotiation.

The ACP AE accepts all contexts in the intersection of the proposed and acceptable presentation contexts. This means that the ACP AE accepts multiple proposed presentation contexts with the same SOP class but different transfer syntaxes. There is no check for duplicate contexts, and these will therefore be accepted.

4.2.2.4.1.3. SOP Specific Conformance for SOP Classes

The ACP AE provides standard conformance to the Verification service class.

The status behavior the ACP AE is as shown in Table 61.

Table 61: Verification C-ECHO Status Response

Service Status	Code	Further Meaning	Description
Success	0000	Verification is successful	The ACP AE is able to confirm application level communication.

4.2.2.4.2. Query/Retrieve

4.2.2.4.2.1. Description and Sequencing of Activities

The ACP AE accepts associations from systems that wish to query the ACP AE database using the C-FIND command, and from systems that wish to retrieve images from the ACP AE database using the C-MOVE command.

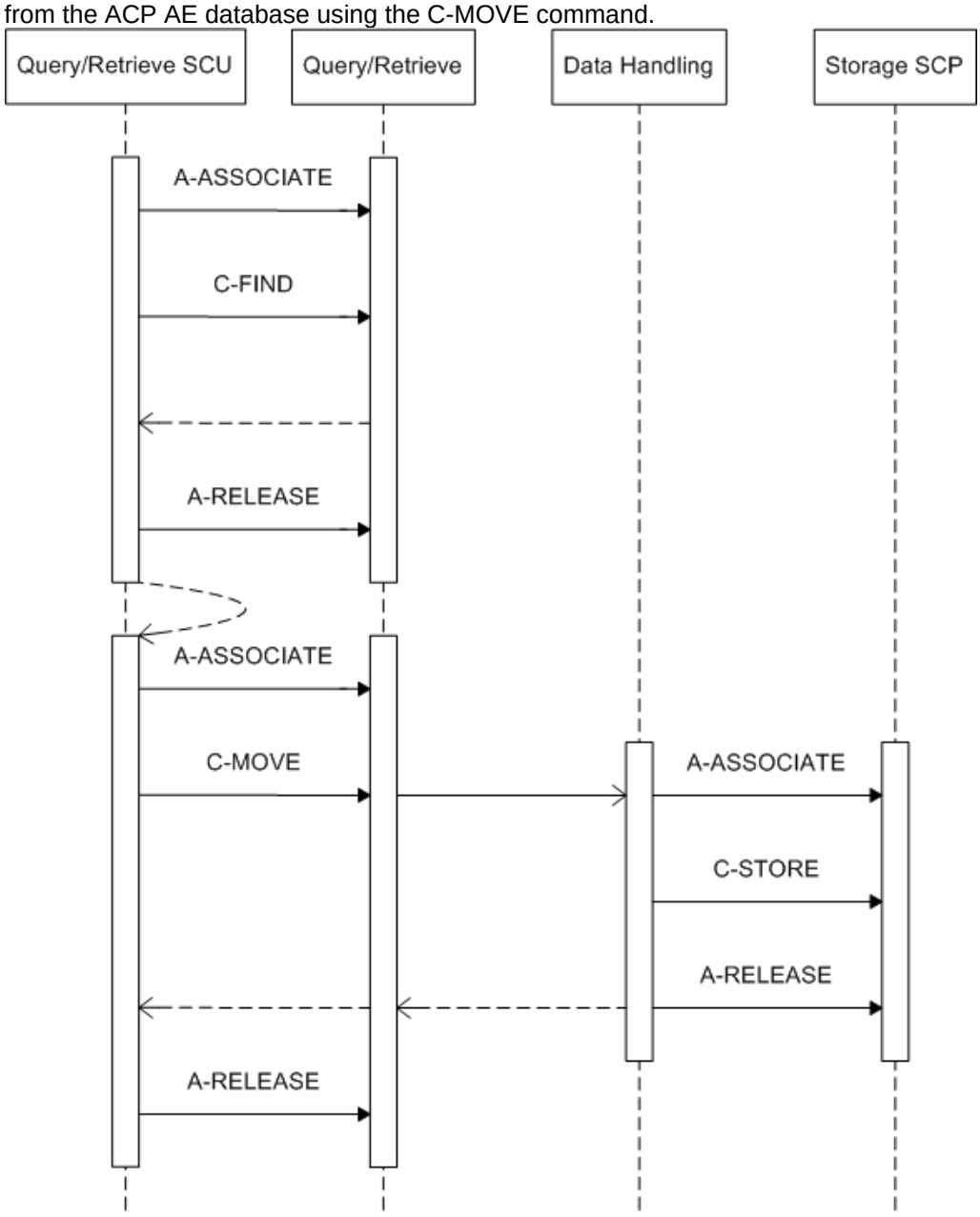

Figure 10: Sequencing of Query/Retrieve

4.2.2.4.2.2. Accepted Presentation Contexts

The ACP AE is able to accept the presentation context as specified in the next table.

Table 62: Acceptable Presentation Context for Query/Retrieve

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query /Retrieve Information Model - FIND	1.2.840. 10008.5.1.4.1.2.1.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Patient Root Query /Retrieve Information Model - MOVE	1.2.840. 10008.5.1.4.1.2.1.2	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Study Root Query /Retrieve Information Model - FIND	1.2.840. 10008.5.1.4.1.2.2.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Study Root Query /Retrieve Information Model - MOVE	1.2.840. 10008.5.1.4.1.2.2.2	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Patient/Study Only Query /Retrieve Information Model - FIND	1.2.840. 10008.5.1.4.1.2.3.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Patient/Study Only Query /Retrieve Information Model - MOVE	1.2.840. 10008.5.1.4.1.2.3.2	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

For performance reasons the ELE transfer syntax is preferred and will be chosen in case multiple transfer syntaxes are proposed in the association negotiation.

The ACP AE accepts all contexts in the intersection of the proposed and acceptable presentation contexts. This means that the ACP AE accepts multiple proposed presentation contexts with the same SOP class but different transfer syntaxes. There is no check for duplicate contexts, and these will therefore be accepted.

4.2.2.4.2.3. SOP Specific Conformance for SOP Classes

The ACP AE provides standard conformance to the Query/Retrieve service class. Relational queries are not supported. The ACP AE will handle simultaneous C-FIND and/or C-MOVE requests simultaneously.

The status behavior the ACP AE is as shown in Table 63 and Table 64.

Table 63: Query/Retrieve C-FIND Status Response

Service Status	Code	Further Meaning	Description
Success	0000	Matching is complete	The C-FIND request handling is completed, no more query responses are sent.

Service Status	Code	Further Meaning	Description
Failure	A700	Refused – Out of Resources	N/A
	A900	Failed – Identifier does not match SOP class	N/A
	C000	Failed – Unable to process	The query request cannot be parsed. The ACP AE logs the reason.
Warning	B000	Sub-operations complete – one or more failures	N/A
Cancel	FE00	Matching terminated due to Cancel Indication	The query request is cancelled; no more query responses are sent.
Pending	FF00	Matches are continuing – current match is supplied and any optional keys were supported in the same manner as required keys	The C-FIND responses are continuing.
	FF01	Matches are continuing – warning that one or more optional keys were not supported for existence and/or matching for this identifier	The C-FIND responses are continuing.

Table 64: Query/Retrieve C-MOVE Status Response

Service Status	Code	Further Meaning	Description
Success	0000	Sub-operations complete – no failures	The retrieve command has been completed.
Failure	A701	Refused – Out of Resources: unable to calculate number of matches	N/A
	A702	Refused – Out of Resources: unable to perform sub-operations	N/A
	A801	Refused – Move destination unknown	No storage command will be sent. The ACP AE logs the reason.
	A900	Failed – Identifier does not match SOP class	N/A
	C000	Failed – Unable to process	The retrieve request cannot be parsed. No storage command will be sent. The ACP AE logs the reason.
Warning	B000	Sub-operations complete – one or more failures	N/A
Cancel	FE00	Sub-operations terminated due to Cancel Indication	The retrieve request is cancelled; no more retrieve responses are sent.
Pending	FF00	Sub-operations are continuing	Approximately every 30 seconds to indicate progress.

The ACP AE distinguishes two patients with the same Patient ID but different Patient's Name or Patient's Birth Date. However, the DICOM Query/Retrieve service class has Patient ID as a unique key at patient level, and thus two patients with the same Patient ID cannot be distinguished via a standard DICOM query.

The following query keys are supported.

Table 65: Supported Query Keys for Query/Retrieve

Attribute Name	Tag	VR	Type Of Matching	Comment
Patient level				
Patient ID	0010,0020	LO	Standard	
Patient's Name	0010,0010	PN	Standard	
Study level				
Study Instance UID	0020,000D	UI	Standard	
Study Date	0008,0020	DA	Standard	
Study Time	0008,0030	TM	Standard	
Accession Number	0008,0050	SH	Standard	
Study ID	0020,0010	SH	Standard	
Series level				
Series Instance UID	0020,000E	UI	Standard	
Modality	0008,0060	CS	Standard	
Series Number	0020,0011	IS	Standard	
Composite Object Instance level				
SOP Instance UID	0008,0018	UI	Standard	
Instance Number	0020,0013	IS	Standard	

When querying optional keys the ACP AE will respond successfully for available keys if queried per universal matching; otherwise it will respond with warning.
Note that when querying optional keys with non-universal matching the ACP AE will return information using universal matching for those keys.
Also note that when a query is performed per Patient/Study Only Query/Retrieve Information Model SOP class on patient level, the ACP AE always returns the attribute “Patient’s Name”, even if it was not requested.

4.2.2.4.3. Storage

4.2.2.4.3.1. Description and Sequencing of Activities

The ACP AE accepts associations from systems that wish to store images in the ACP AE database using the C-STORE command.

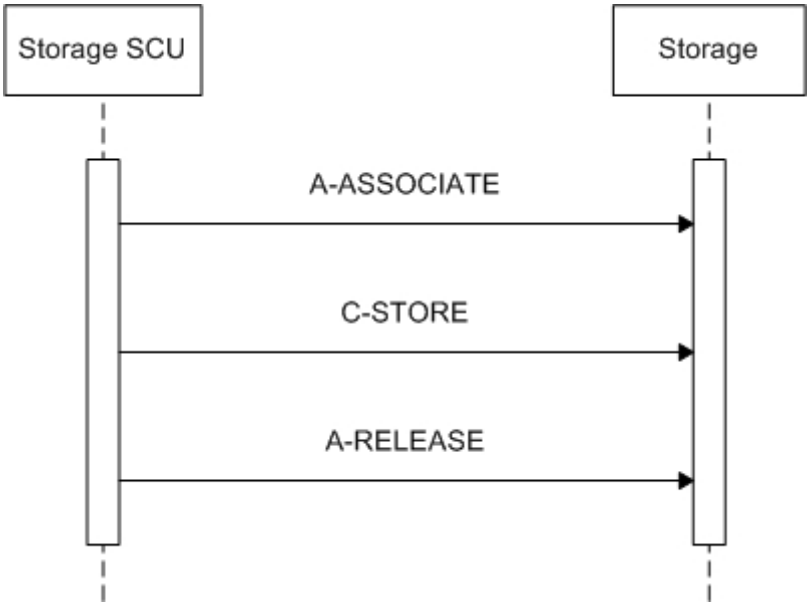

Figure 11: Sequencing of Storage

4.2.2.4.3.2. Accepted Presentation Contexts

The ACP AE is able to accept the presentation context as specified in the next table.

Table 66: Acceptable Presentation Context for Storage

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
All transfer SOP classes as configured for the SCU.		ILE	1.2.840.10008.1.2	SCP	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		
		JPEG Baseline*	1.2.840.10008.1.2.4 .50		

* Only for Ultrasound SOP classes with photometric interpretation of RGB and YBR_FULL_422. Therefore JPEG Baseline transfer syntax may NOT be configured for SCU systems that are capable of handling storage of monochrome images too.

For performance reasons the ELE transfer syntax is preferred and will be chosen in case multiple transfer syntaxes are proposed in the association negotiation.

The ACP AE accepts all contexts in the intersection of the proposed and acceptable presentation contexts. This means that the ACP AE accepts multiple proposed presentation contexts with the same SOP class but different transfer syntaxes. There is no check for duplicate contexts, and these will therefore be accepted.

4.2.2.4.3.3. SOP Specific Conformance for SOP Classes

The ACP AE provides standard level 1 (Base) conformance to the Storage service class.

The status behavior the ACP AE is as shown in Table 67.

Table 67: Storage C-STORE Status Response

Service Status	Code	Further Meaning	Description
Success	0000	Storage is complete	The image(s) will be stored in the ACP AE database.
Failure	A700	Refused – Out of Resources	The ACP AE database is full – recovery from this condition is left to the SCU. The ACP AE will send a notification, log the condition, and abort the association.
	A900	Error – Data set does not match SOP class	The SOP class of the image(s) does not match the negotiated abstract syntax. The ACP AE will send a notification, log the condition, and abort the association.
	C000	Error – Cannot understand	The image(s) cannot be parsed. The ACP AE will send a notification, log the condition, and abort the association.
Warning	B000	Coercion of data elements	N/A
	B006	Elements discarded	N/A
	B007	Data set does not match SOP class	N/A

Refer to section 8.1.2 for description of Usage of Attributes from Received IOD's.

4.2.2.4.4. Storage Commitment

4.2.2.4.4.1. Description and Sequencing of Activities

The ACP AE will act as a Storage Commitment SCU for the configured Storage Commitment SCP to receive asynchronous storage commitment reports from storage commitment requests send by the ACP AE Data Handling (as Storage Commitment SCU), using a negotiated presentation context.

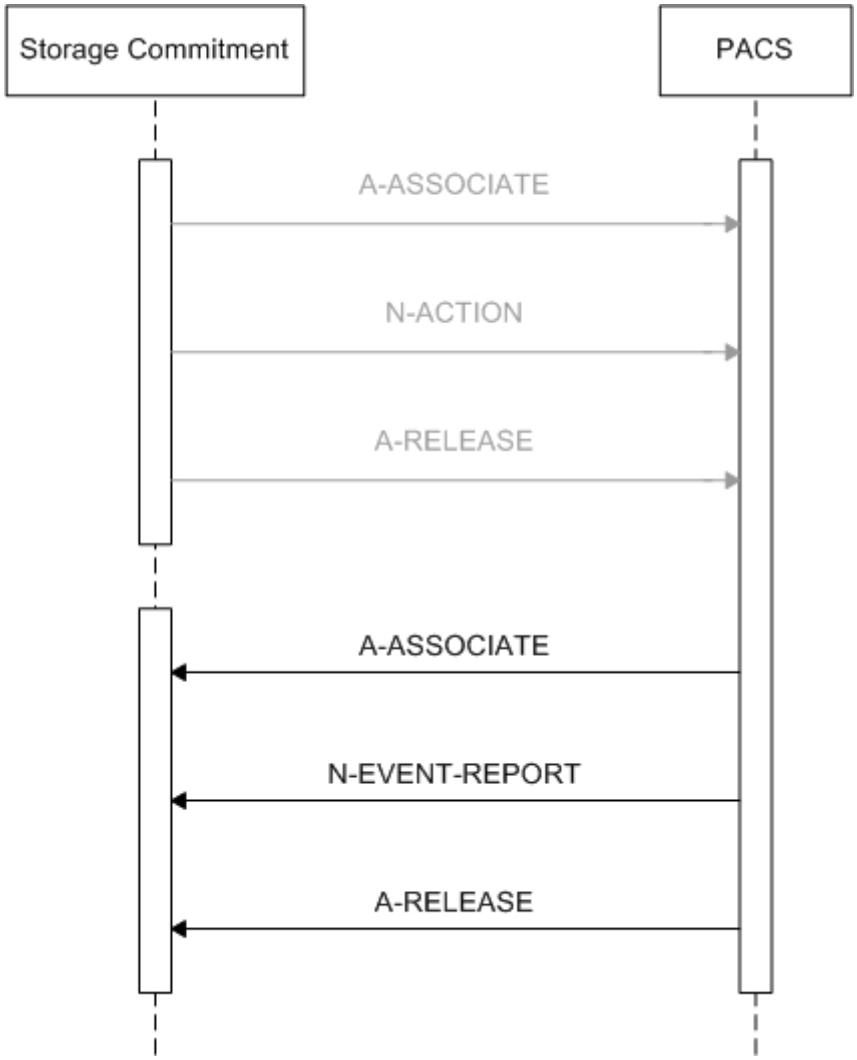

Figure 12: Sequencing of Storage Commitment

After the ACP AE accepts an association from the remote Storage Commitment SCP it will receive storage commitment reports, send responses including the relevant status, and finally release the association on SCP request.

4.2.2.4.4.2. Accepted Presentation Contexts

The ACP AE is able to accept the presentation context as specified in the next table.

Table 68: Acceptable Presentation Context for Storage Commitment

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	ILE	1.2.840.10008.1.2	SCU	None
		ELE	1.2.840.10008.1.2.1		
		EBE	1.2.840.10008.1.2.2		

For performance reasons the ELE transfer syntax is preferred and will be chosen in case multiple transfer syntaxes are proposed in the association negotiation.

The ACP AE accepts all contexts in the intersection of the proposed and acceptable presentation contexts. This means that the ACP AE accepts multiple proposed presentation contexts with the same SOP class but different transfer syntaxes. There is no check for duplicate contexts, and these will therefore be accepted.

4.2.2.4.4.3. SOP Specific Conformance for SOP Classes

The ACP AE provides standard conformance to the Storage Commitment service class.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

Table 69: DICOM N-EVENT-REPORT Command Response Status Handling Behavior

Service Status	Code	Further Meaning	Behavior
Success	0000	Confirmation	-

The ACP AE does not take any more actions on receiving the N-EVENT-REPORT, even when failures exist (Event Type ID 2).

Table 70: DICOM Command Communication Failure Behavior

Exception	Behavior
Reply time-out	The association is released. Continues with waiting for storage commitment.
Association time-out SCU	The association is released. Continues with waiting for storage commitment.
Association aborted	Continues with waiting for storage commitment.

4.3. Network Interfaces

4.3.1. Physical Network Interface

The Eleva (both the RIS AE and the ACP AE) provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of [DICOM].

The Eleva inherits its TCP/IP stack from Windows XP (i.e. the operating system platform).

The Eleva supports a single network interface: Ethernet ISO.8802-3.

The standard supported physical media include:

- IEEE 802.3 10BASE-TX;
- IEEE 802.3 100BASE-TX (Fast Ethernet);
- IEEE 802.3 1000BASE-X (Fiber Optic Gigabit Ethernet).

4.3.2. Additional Protocols

Additional protocols such as used for network management are listed here.

4.4. Configuration

The Eleva system is configured by means of a configuration program. This program is accessible at start-up of the Eleva system. It is password protected and intended to be used by Philips Customer Support Engineers only.

The configuration program will prompt the Customer Support Engineer to enter configuration information as required by the Eleva.

4.4.1. AE Title/Presentation Address Mapping

4.4.1.1. Local AE Titles

The Eleva exists of two Application Entity titles and two IP addresses; one for the RIS AE and one for the ACP AE.
At installation the Customer Support Engineer can change the ACP AE host name.
The ACP AE can be changed independently.

Table 71: AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
RIS AE	<IP host name of the RIS AE>	3010
ACP AE	<IP host name of the ACP AE>	3010 (not configurable)

4.4.1.2. Remote AE Title/Presentation Address Mapping

For the RIS AE the AE Title, host names and port numbers of remote applications are configured using the FSF Service tool.
For the ACP AE the AE Title, host names and port numbers of remote applications are configured using the Configuration tool.

4.4.1.2.1. Remote Association Initiators

All relevant remote applications that are able to setup a DICOM association towards the ACP AE must be configured at Eleva configuration time.

The Customer Support Engineer must provide the following information for each remote application:

- The Application Entity Title;
- The SOP classes and transfer syntaxes for which the ACP AE accepts associations.

4.4.1.2.2. Remote Association Acceptors

The following information must be provided for all relevant remote applications that are able to accept DICOM associations from the RIS AE or the ACP AE:

- The Application Entity Title;
- The Host name / IP address on which the remote application resides;
- The port number at which the remote application accepts association requests.

4.4.2. Parameters

The configuration parameters for the RIS AE are given in Table 72, and categorized in the following sections:

- General Parameters;
- System control;
- RIS Parameters.

Table 72: RIS AE Configuration Parameters table

Parameter	Configurable	Default Value
General Parameters		
Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout)	Yes	0 (unlimited)
System Control – Location Parameters		
Location – Local system ID (Station Name < 16 Characters)	Yes	RF_System
Location – Hospital name (Institution Name)	Yes	Hospital
System Control – Patient Database Parameters		
Patient Database – Issuer of Patient ID	Yes	
RIS – Network Parameters		
IP address	Yes	
Subnet mask	Yes	
Default gateway	Yes	
RIS – System DICOM Node Parameters		
AE Title	Yes	IP host name of the RIS AE
PortNumber	Yes	3010
Max Data PDU Length	Yes	16384
Artim timeout	Yes	60 [s]
Maximum nr of incoming associations	Yes	
RIS – External DICOM Nodes Parameters		
AE Title	Yes	
PortNumber	Yes	
IP Address	Yes	
Artim Timeout	Yes	
Automatic Association Timeout	Yes	
SOP class support	Yes	
Transfer syntax support	Yes	ILE, ELE, EBE

Parameter	Configurable	Default Value
RIS – Worklist Management (WLM) Parameters		
WLM network node name	Yes	
General WLM Settings – Background broad query time interval	Yes	0 [min] (no background query)
DICOM WLM Settings – RIS query time-out	Yes	240 [min]
DICOM WLM Settings – WLM query requests attribute 'specific character set (0008,0005)'	Yes	No
DICOM WLM Settings – Scheduled Procedure Step ID (0040,0009) is mandatory	Yes	No
DICOM Query Attributes – Broad query SPS start date	Yes	today
DICOM Query Attributes – Broad query modality	Yes	all
DICOM Query Attributes – Broad query AE title	Yes	ALL
RIS – Emergency Patient Parameters		
Emergency patient sex	Yes	female
Emergency patient name male	Yes	Doe^John
Emergency patient name female	Yes	Doe^Jane
Emergency patient name other	Yes	Doe^J
RIS – MPPS Parameters		
MPPS network node name	Yes	

The configuration parameters for the ACP AE are given in Table 73, and categorized in the following sections:

- General Parameters;
- Local Configurable Parameters;
- Remote Configurable Parameters;
- General Print Parameters;
- Printer Specific Print Parameters.

Table 73: ACP AE Configuration Parameters table

Parameter	Configurable	Default Value
General Parameters		
Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout)	No	-
General DIMSE level time-out values	No	-
Time-out waiting for response to TCP/IP connect request. (Low-level timeout)	No	-
Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)	No	-
Time-out for waiting for data between TCP/IP packets. (Low-level timeout)	No	-
Any changes to default TCP/IP settings, such as configurable stack parameters.	No	-
Local Configurable Parameters		
Size constraint in maximum object size (see note 1)	No	-
Maximum PDU size the AE can receive	Yes	0 (unlimited)
Maximum PDU size the AE can send	No	unlimited
AE specific DIMSE level time-out values	No	-
Number of simultaneous associations by service and/or SOP class	No	-
SOP class support	Yes	none
Transfer syntax support[1]	Yes	ELE

Parameter	Configurable	Default Value
Remote Configurable Parameters		
Size constraint in maximum object size	No	-
Maximum PDU size the AE can receive	Yes	0 (unlimited)
Maximum PDU size the AE can send	No	unlimited
AE specific DIMSE level time-out values	No	-
Number of simultaneous associations by service and/or SOP class	No	-
SOP class support	Yes	none
Transfer syntax support	Yes	ELE
Storage commitment request must be sent after storage request	Yes	not
Storage commitment time-out (synchronous to asynchronous)	Yes	none
Automatic conversion of images of SOP classes not supported by remote systems into Secondary Capture Image Storage SOP instances	Yes	convert to SC
Export of pure DICOM images (i.e. only the standard DICOM attributes as defined in the related IOD) or extended DICOM images (with additional Standard DICOM, Private and Retired attributes)	Yes	allow all attributes
Support of overlays for DICOM node not supporting Presentation State objects[2]	Yes	enabled
Support of overlays for DICOM node supporting presentation state objects[2]	Yes	disabled
Support of overlays for CD[2]	Yes	disabled
General Print Parameters		
The DICOM printers that may be selected by the operator	Yes	none
Printer Specific Print Parameters[3]		
Medium type	Yes	all available
Film size ID (i.e. media size)	Yes	all available
Resolution (300 / 600 dpi)	Yes	300
Color model (8 / 16 bits color)	Yes	8
Min Density	Yes	0
Max Density	Yes	0

Notes

1. The JPEG Baseline transfer syntax is only supported for RGB and YBR_FULL_422 images; therefore JPEG Baseline may NOT be configured for systems that are capable of handling storage of monochrome images too.

2. The MultiDiagnost Eleva with Flat Detector Copy-tool can override the configured setting of overlay support.

3. These print parameters can be selected from choice lists. These choice lists are defined via so-called prototypes for each type of printer and print medium. These prototypes are also configurable.

5. MEDIA INTERCHANGE

5.1. Implementation Model

The implementation model identifies the DICOM application entities in a specific implementation, and relates the application entities to real-world activities.

5.1.1. Application Data Flow Diagram

The Eleva media interchange is implemented in one single application entity only: the ACP AE.

Figure 13 shows the media interchange application data flow as a functional overview of the ACP AE for DICOM CD and DVD media.

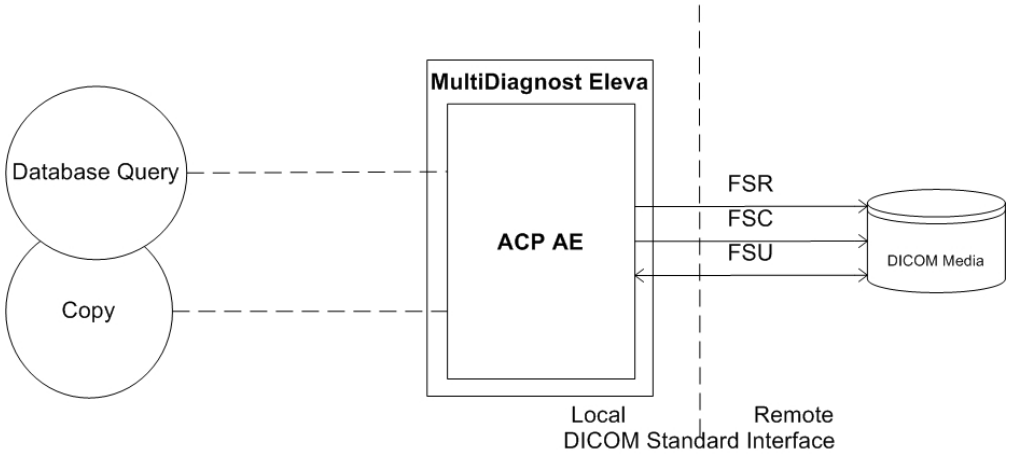

Figure 13: Application Data Flow Diagram

5.1.2. Functional Definitions of AE's

5.1.2.1. Functional Definition of ACP AE

The ACP AE is the one and only application entity within the Eleva. It includes the following service class.

Media Storage Service Class for CD and DVD

For CD media the ACP AE can perform the Media Storage service as SCU with capabilities for:

- RWA Database Query (as FSR) ;
- RWA Copy (as FSR, FSC, FSU).

For DVD media the ACP AE can perform the Media Storage service as SCU with capabilities for:

- RWA Database Query (as FSR) ;
- RWA Copy (as FSR, FSC).

The ACP AE implementation to read and write media is the same as the Networking implementation of Data Handling to open database/disk (RWA Database Query) and copy data (RWA Copy). After Database Query the contents of the media is displayed in the Data management screen. Using Copy the selected content can be copied from

media to another database. Copy can also be used to copy selected content from the actual database in the Data management screen to media.

5.1.3. Sequencing of Real World Activities

Whenever a CD or DVD has to written the ACP AE first tries to read the DICOMDIR. The ACP AE will compile the updated DICOMDIR and any required DICOM images into a CD or DVD session image; this CD or DVD session image will be written to CD or DVD disk.

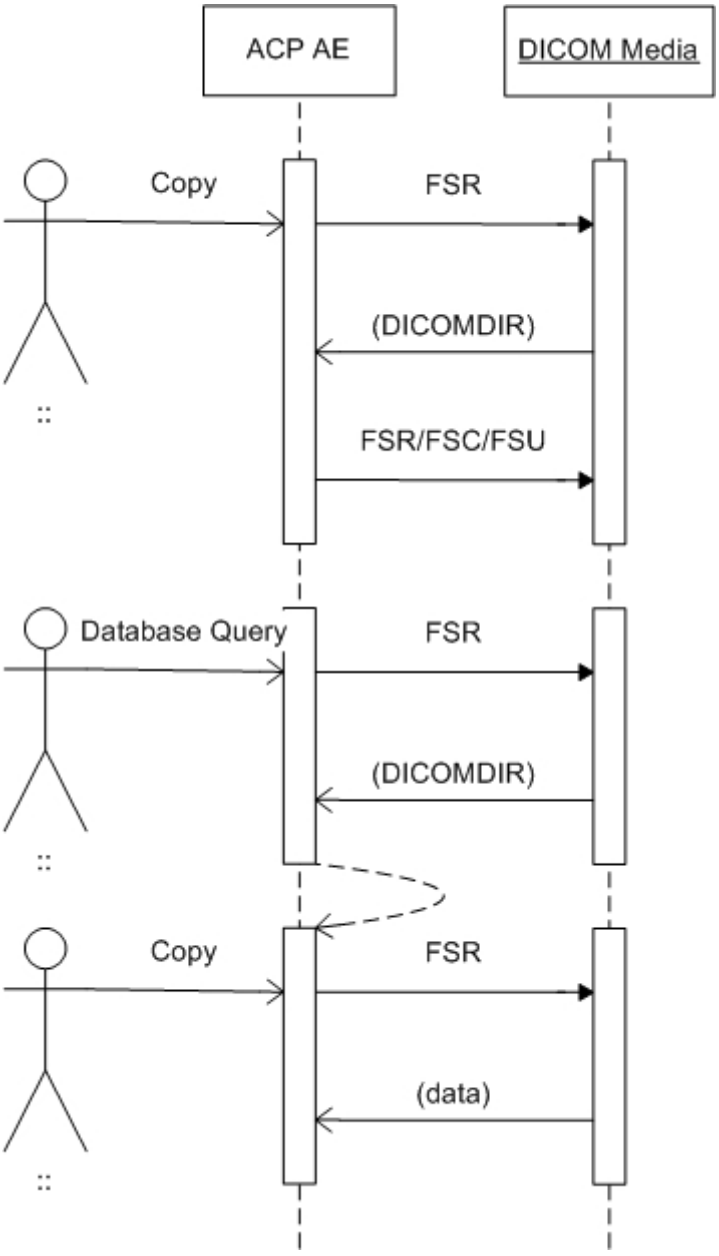

Figure 14: Sequencing of ACP AE Media Interchange

5.1.4. File Meta Information for Implementation Class and Version

This section lists the values assigned to the File Meta Information attributes (ref. [DICOM] PS 3.10) that pertain to the Implementation Class and Version.

The Implementation Class UID and the Implementation Version Name in the File Meta Header are as specified for Networking (ref. Table 30 in section 4.2.2.2.4).

Table 74: DICOM Implementation Class and Version for ACP AE

File Meta Information attributes	Value
File Meta Information Version	00, 01
Implementation Class UID	1.3.46.670589.5.2.23
Implementation Version Name	ViewForum R4.2

5.2. AE Specifications

The next section in the DICOM Conformance Statement contains the specification of the one and only application entity: the ACP AE.

5.2.1. ACP AE

For reading and writing the ACP AE provides standard conformance to:

- the DICOM media Storage Service and File Format ([DICOM] PS 3.10);
- the Media Storage Application Profiles ([DICOM] PS 3.11); and
- the Media Formats and Physical Media for Media Interchange ([DICOM] PS 3.12).

The ACP AE supports multi-patient and multi-session CD/DVD disks, both for reading and writing.

Supported media by the ACP AE are:

- CD: CD-R/CD-RW with the profile STD-GEN-CD and
- DVD: DVD+R and DVD+RW with the profile STD-GEN-DVD-JPEG and the transfer syntax ELE (uncompressed).

The DVD–R and DVD–RW media can be read but are NOT supported for writing.

The supported application profiles, their roles and the Service Class (SC) options, all defined in DICOM terminology, are listed in Table 75.

Table 75: AE Related Application Profiles, Real-World Activities, and Roles

Supported Application Profile	Real-World Activity	Roles	SC Option
STD-GEN-CD	Database Query	FSR	Interchange
	Copy	FSR, FSC, FSU	Interchange
STD-GEN-DVD-JPEG	Database Query	FSR	Interchange
	Copy	FSR, FSC	Interchange

Only adding on instances is supported for the FSU, deleting is not supported.
JPEG compression is not supported, only ELE support is implemented.

5.2.1.1. File Meta Information for the ACP AE

The Source Application Entity Title is configurable (ref. section 5.4 Media Configuration).

5.2.1.2. Real-World Activities

5.2.1.2.1. Database Query

When a database/disk open action is initiated on the CD-R or DVD then the ACP AE acts as an FSR using the interchange option to read the DICOMDIR of the CD or DVD medium.

This will result in an overview of the patients, studies, series and images on the ACP AE screen.

5.2.1.2.1.1. Media Storage Application Profile

As depicted in Table 75, the ACP AE supports the RWA Database Query for the STD-GEN-CD and the STD-GEN-DVD-JPEG application profile.

5.2.1.2.1.1.1. Options

The mandatory DICOMDIR keys are required for the correct displaying of directory information. The displaying is structured according the DICOM Composite Information Model: Patient, Study, Series and Image.

5.2.1.2.2. Copy

When an image transfer from CD-R or DVD is initiated then the ACP AE acts as an FSR using the interchange option to import SOP instances from the CD-R/DVD medium.

When an image transfer to CD-R or DVD is initiated then the ACP AE acts as an FSC or FSU (CD-R only) using the interchange option to export SOP instances from the local database to a CD-R or DVD medium.

5.2.1.2.2.1. Media Storage Application Profile

As depicted in Table 75, the ACP AE supports the RWA Copy for the STD-GEN-CD and the STD-GEN-DVD-JPEG application profile.

5.2.1.2.2.1.1. Options

For ACP AE as FSR the mandatory attributes of the DICOM images are required for the correct storage of the images in the ACP AE internal image database.

Optional attributes and Retired/Private attributes are stored too – if present; this is equivalent with the level 2 (Full) conformance for the Storage service class for Networking; ref. section 4.2.2.4.3.

The same remarks as in section 4.2.2.4.3.3 about the storage of images and about requirements to process read images via the dedicated ACP AE application functions are applicable.

For ACP AE as FSC/FSU the same remarks as in section 4.2.2.3.1.3.3 about the existence of optional, retired, and private attributes are applicable.
The DICOMDIR file will be extended when new images are written. In case some attributes are not present in an image but are specified as mandatory in the DICOMDIR definition in DICOM media, a generated value will be filled in.

Implementation remarks and restrictions
Only adding on instances is supported for the FSU, deleting is not supported.

For STD-GEN-DVD-JPEG profile only DVD+R and DVD+RW with transfer syntax ELE (uncompressed) is supported; JPEG compression is not supported.
The DVD–R and DVD–RW media can be read but are NOT supported for writing.

When writing the DICOMDIR records, key values are generated when no value of the corresponding attribute is supplied, according to the following table.

Table 76: Generated Keys

Key	Tag	Generated Value
Patient Keys		
Patient ID	0010,0020	At import MULTIDIAGNOST ELEVA with FLAT DETECTOR ACP each time creates a new value based on the Study Instance UID for each new study written to the CD-R / DVD (even if this study belongs to a patient recorded earlier). Otherwise the default-generated value will be a succession of “UNKNOWN”, the Patient’s Name, the Patient’s Birth Date, and the Patient’s Sex, concatenated by using underscore characters.
Study Keys		
Study Date	0008,0020	Date on which this Study was created.
Study Time	0008,0030	Time on which this Study was created.
Study ID	0020,0010	“UNKNOWN”
Series Keys		
Series Number	0020,0011	1
Image Keys		
Instance Number	0020,0013	1

The default value for the Pixel Intensity Relationship (0028,1040) is set to DISP.
The ACP AE can write volumes of the media to that media.
The ACP AE asks for a new media if media is spanning over more disks.

5.3. Augmented and Private Application Profiles

The ACP AE does not support any augmented or private application profiles.

5.4. Media Configuration

Any configuration issues may be found in the Networking section 4.4 Configuration.

6. SUPPORT OF CHARACTER SETS

This section describes the Eleva support for character sets in Network and Media services.

Table 77: Supported DICOM Character Sets of Eleva

Character Set Description	Defined Term	ESC Sequence	ISO Registration Number	Code Element	Character Set
Single-byte Character Sets without Code Extensions					
Default repertoire	-	-	ISO-IR 6	G0	ISO 646
Latin alphabet No. 1	ISO_IR 100	-	ISO-IR 6	G0	ISO 646
		-	ISO-IR 100	G1	Supplementary set of ISO 8859

When the Eleva receives images with undefined character set then the import will be terminated with error status code.

The default factory settings for the WLM query request attribute "Specific Character Set" (0008,0005) is "NO" and should be configured to “YES” for support of the “\” (27H) character.

The following notes apply for II-TV acquisitions only
- incl. all monitors except when active for displaying RIS and ACP functionality

Note that character with hexadecimal value B6 is supported, but on monitor it is shown as the pi character.

The characters with following hexadecimal values are partly supported. For display on monitor such values are translated into upside down question marks “¿”. For DICOM export the original values are used.

A0, A6, A8, A9, AD, AE, AF,
B1, B4, B8, B9, BE,
C0, C1, C2, C3, C8, CA, CB, CC, CD, CE, CF,
D0, D2, D3, D4, D5, D9, DA, DB, DD, DE,
E3,
F0, F5, FD, FE

The characters in the following range of hexadecimal values are not supported. Initiation of an acquisition using any of these characters will be rejected and logged.

00..1F, 7F..9F

7. SECURITY

7.1. Security Profiles

None supported.

7.2. Association Level Security

Any calling AE title and/or IP address may open an association.

7.3. Application Level Security

The Eleva does not support the HIPAA Audit trail profile.

8. ANNEXES

8.1. IOD Contents

8.1.1. Created SOP Instances

This section specifies each IOD created by the Eleva.

The following abbreviations may be used in the module table “Presence of Value” specification.

ALWAYS	The attribute is always present with a value;
ANAP	The attribute is present under specified condition – if present then it will always have a value;
ANAPCV	The attribute is present under specified condition – if present then its value is not always present (if attribute is present and condition on value does not apply then attribute sent zero length);
ANAPEV	The attribute is present under specified condition – if present then it will not have any value (if attribute is present then sent zero length);
EMPTY	The attribute is always present without any value (attribute sent zero length);
VNAP	The attribute is always present and its value is not always present (if condition on value does not apply then attribute sent zero length)

The following abbreviations may be used in the module table “Source” specification.

AUTO	The attribute value is generated automatically
CONFIG	The attribute value source is a configurable parameter
COPY	The attribute value source is another SOP instance
FIXED	The attribute value is hard-coded in the application
IMPLICIT	The attribute value source is a user-implicit setting
MPPS	The attribute value source is a Modality Performed Procedure Step
MWL	The attribute value source is a Modality Worklist
USER	The attribute value source is explicit user input

Table 78: List of created SOP Classes

SOP Class Name	SOP Class UID
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7
Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2
Specialized PMS X-Ray Image Store	1.3.46.670589.2.3.1.1

8.1.1.1. Secondary Capture Image Storage SOP Class

Table 79: IOD of Created Secondary Capture Image Storage SOP Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
Series	General Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
	SC Equipment Module	ALWAYS
Image	General Image Module	ALWAYS
	Image Pixel Module	ALWAYS
	SC Image Module	ALWAYS
	VOI LUT Module	CONDITIONAL
	SOP Common Module	ALWAYS

Table 80: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN		ALWAYS	COPY	
Patient ID	0010,0020	LO		VNAP	COPY	
Patient's Birth Date	0010,0030	DA		VNAP	COPY	
Patient's Sex	0010,0040	CS		VNAP	COPY	

Table 81: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		ALWAYS	AUTO	
Study Time	0008,0030	TM		ALWAYS	AUTO	
Accession Number	0008,0050	SH		VNAP	COPY	
Referring Physician's Name	0008,0090	PN		VNAP	COPY	
Study Description	0008,1030	LO		VNAP	AUTO/ USER	
Referenced Study Sequence	0008,1110	SQ		ANAP	COPY	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	COPY	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	COPY	
Study Instance UID	0020,000D	UI		ALWAYS	COPY	
Study ID	0020,0010	SH		VNAP	COPY	

Table 82: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ALWAYS	AUTO	
Series Time	0008,0031	TM		ALWAYS	AUTO	
Performing Physician's Name	0008,1050	PN		VNAP	COPY	
Referenced Performed Procedure Step Sequence	0008,1111	SQ		ANAP	COPY	
>Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.3.1.2.3.3	ALWAYS	COPY	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	COPY	
Protocol Name	0018,1030	LO		VNAP	AUTO/ USER	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		ALWAYS	COPY	
Laterality	0020,0060	CS		EMPTY	FIXED	
Performed Procedure Step Start Date	0040,0244	DA		ALWAYS	COPY	
Performed Procedure Step Start Time	0040,0245	TM		ALWAYS	COPY	
Performed Procedure Step ID	0040,0253	SH		ALWAYS	COPY	
Performed Procedure Step Description	0040,0254	LO		VNAP	COPY	
Request Attributes Sequence	0040,0275	SQ		ANAP	COPY	
>Scheduled Procedure Step Description	0040,0007	LO		ANAP	COPY	
>Scheduled Protocol Code Sequence	0040,0008	SQ		ANAP	COPY	
>>Code Value	0008,0100	SH		ALWAYS	COPY	
>>Coding Scheme Designator	0008,0102	SH		ALWAYS	COPY	
>>Code Meaning	0008,0104	LO		ALWAYS	COPY	
>Scheduled Procedure Step ID	0040,0009	SH		ALWAYS	COPY	
>Requested Procedure ID	0040,1001	SH		ALWAYS	COPY	

Table 83: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips Medical Systems	ALWAYS	FIXED	
Institution Name	0008,0080	LO		ALWAYS	CONFIG	
Station Name	0008,1010	SH	RF_System	ALWAYS	CONFIG	
Manufacturer's Model Name	0008,1090	LO	Extended Digital Imaging	ALWAYS	FIXED	
Device Serial Number	0018,1000	LO		ALWAYS	FIXED	
Software Version(s)	0018,1020	LO	PMS1.1 MIMIT EVIIMDictionary	ALWAYS	AUTO	

Table 84: SC Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	RF	ALWAYS	COPY	
Conversion Type	0008,0064	CS	DV, WSD	ALWAYS	AUTO	

Table 85: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS		ALWAYS	AUTO	
Acquisition Date	0008,0022	DA		ALWAYS	COPY	
Content Date	0008,0023	DA		ALWAYS	COPY	
Acquisition Time	0008,0032	TM		ALWAYS	COPY	
Content Time	0008,0033	TM		ALWAYS	COPY	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Number	0020,0012	IS		ANAP	AUTO	
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Patient Orientation	0020,0020	CS		ANAPEV	AUTO	
Image Comments	0020,4000	LT		ANAP	USER	If entered by user and if annotations are present. Contains the image annotations on normal (non-zoomed) images. Format: (<x>,<y>) <text>

Table 86: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Samples per Pixel	0028,0002	US	1, 3	ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS	MONOCHROME2, RGB	ALWAYS	AUTO	
Planar Configuration	0028,0006	CS	0	ANAP	AUTO	
Rows	0028,0010	US	512, 1024	ALWAYS	AUTO	
Columns	0028,0011	US	512, 1024	ALWAYS	AUTO	
Bits Allocated	0028,0100	US	8	ALWAYS	AUTO	
Bits Stored	0028,0101	US	8	ALWAYS	AUTO	
High Bit	0028,0102	US	7	ALWAYS	AUTO	
Pixel Representation	0028,0103	US	0	ALWAYS	AUTO	
Pixel Data	7FE0,0010	OB /O W		ALWAYS	IMPLICIT	

Table 87: SC Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Date of Secondary Capture	0018,1012	DA		ANAP	AUTO	
Time of Secondary Capture	0018,1014	TM		ANAP	AUTO	

Table 88: VOI LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Window Center	0028,1050	DS		ALWAYS	AUTO	
Window Width	0028,1051	DS		ALWAYS	AUTO	

Table 89: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS	ISO_IR 100	ANAP	COPY	
SOP Class UID	0008,0016	UI		ALWAYS	FIXED	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	

8.1.1.2. Softcopy Presentation State Storage SOP Class

Table 90: IOD of Created Softcopy Presentation State Storage SOP Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
Series	General Series Module	ALWAYS
	Presentation Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
Presentation State	Display Shutter Module	ALWAYS
	Displayed Area Module	ALWAYS
	Graphic Annotation Module	CONDITIONAL
	Graphic Layer Module	CONDITIONAL
	Softcopy Presentation LUT Module	ALWAYS
	Softcopy VOI LUT Module	CONDITIONAL
	Presentation State Identification Module	ALWAYS
	Presentation State Relationship Module	ALWAYS
	Presentation State Shutter Module	ALWAYS
	SOP Common Module	ALWAYS

Table 91: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN		ALWAYS	COPY	
Patient ID	0010,0020	LO		VNAP	COPY	
Patient's Birth Date	0010,0030	DA		VNAP	COPY	
Patient's Sex	0010,0040	CS		VNAP	COPY	

Table 92: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		ALWAYS	COPY	
Study Time	0008,0030	TM		ALWAYS	COPY	
Accession Number	0008,0050	SH		VNAP	COPY	
Referring Physician's Name	0008,0090	PN		VNAP	COPY	
Study Description	0008,1030	LO		VNAP	COPY	
Referenced Study Sequence	0008,1110	SQ		ANAP	COPY	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	COPY	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	COPY	
Study Instance UID	0020,000D	UI		ALWAYS	COPY	
Study ID	0020,0010	SH		VNAP	COPY	

Table 93: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ALWAYS	AUTO	
Series Time	0008,0031	TM		ALWAYS	AUTO	
Performing Physician's Name	0008,1050	PN		VNAP	AUTO	Current physician

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Referenced Performed Procedure Step Sequence	0008,1111	SQ	-	ANAP	COPY	
>Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.3.1.2.3.3	ALWAYS	COPY	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	COPY	
Protocol Name	0018,1030	LO	-	ANAP	COPY	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		VNAP	AUTO	
Laterality	0020,0060	CS		ANAPCV	AUTO	Presence defined per EPX.
Performed Procedure Step Start Date	0040,0244	DA		ANAP	COPY	
Performed Procedure Step Start Time	0040,0245	TM		ANAP	COPY	
Performed Procedure Step ID	0040,0253	SH		ANAP	COPY	
Performed Procedure Step Description	0040,0254	LO		VNAP	COPY	
Request Attributes Sequence	0040,0275	SQ	-	ANAP	COPY	
>Scheduled Procedure Step Description	0040,0007	LO		ANAP	COPY	
>Scheduled Procedure Step ID	0040,0009	SH		ALWAYS	COPY	
>Requested Procedure ID	0040,1001	SH		ALWAYS	COPY	

Table 94: Presentation Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	PR	ALWAYS	FIXED	

Table 95: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips Medical Systems	ALWAYS	FIXED	
Institution Name	0008,0080	LO	Hospital	VNAP	CONFIG	
Station Name	0008,1010	SH	RF_System	VNAP	CONFIG	
Manufacturer's Model Name	0008,1090	LO	Extended Digital Imaging, ViewForum	ALWAYS	AUTO	
Device Serial Number	0018,1000	LO		ALWAYS	FIXED	
Software Version(s)	0018,1020	LO		ALWAYS	FIXED	

Table 96: Display Shutter Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Shutter Shape	0018,1600	CS	CIRCULAR, RECTANGULAR	ALWAYS	AUTO	
Shutter Left Vertical Edge	0018,1602	IS		ANAP	IMPLICIT	
Shutter Right Vertical Edge	0018,1604	IS		ANAP	IMPLICIT	
Shutter Upper Horizontal Edge	0018,1606	IS		ANAP	IMPLICIT	
Shutter Lower Horizontal Edge	0018,1608	IS		ANAP	IMPLICIT	
Center of Circular Shutter	0018,1610	IS		ANAP	IMPLICIT	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Radius of Circular Shutter	0018,1612	IS		ANAP	IMPLICIT	

Table 97: Displayed Area Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Displayed Area Selection Sequence	0070,005A	SQ		ALWAYS	IMPLICIT	
>Displayed Area Top Left Hand Corner	0070,0052	SL	1\1	ALWAYS	IMPLICIT	
>Displayed Area Bottom Right Hand Corner	0070,0053	SL	1024\1024	ALWAYS	IMPLICIT	
>Presentation Size Mode	0070,0100	CS	SCALE TO FIT	ALWAYS	IMPLICIT	
>Presentation Pixel Spacing	0070,0101	DS		ANAP	IMPLICIT	
>Presentation Pixel Aspect Ratio	0070,0102	IS		ANAP	IMPLICIT	

Table 98: Graphic Annotation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Graphic Annotation Sequence	0070,0001	SQ		ALWAYS	AUTO	
>Graphic Layer	0070,0002	CS	Layer created on import VFGFX	ALWAYS	AUTO	
>Text Object Sequence	0070,0008	SQ		ANAP	AUTO	
>>Bounding Box Annotation Units	0070,0003	CS	PIXEL	ANAP	AUTO	
>>Anchor Point Annotation Units	0070,0004	CS	PIXEL	ANAP	AUTO	
>>Unformatted Text Value	0070,0006	ST		ALWAYS	USER	degr, %, mm
>>Bounding Box Top Left Hand Corner	0070,0010	FL		ANAP	IMPLICIT	
>>Bounding Box Bottom Right Hand Corner	0070,0011	FL		ANAP	IMPLICIT	
>>Bounding Box Text Horizontal Justification	0070,0012	CS		ANAP	IMPLICIT	
>>Anchor Point	0070,0014	FL		ANAP	IMPLICIT	
>>Anchor Point Visibility	0070,0015	CS		ANAP	IMPLICIT	
>Graphic Object Sequence	0070,0009	SQ		ANAP	AUTO	
>>Graphic Annotation Units	0070,0005	CS	PIXEL	ALWAYS	AUTO	
>>Graphic Dimensions	0070,0020	US		ALWAYS	FIXED	
>>Number of Graphics Points	0070,0021	US		ALWAYS	AUTO	
>>Graphic Data	0070,0022	FL		ALWAYS	AUTO	
>>Graphic Type	0070,0023	CS		ALWAYS	IMPLICIT	
>>Graphic Filled	0070,0024	CS		ANAP	IMPLICIT	

Table 99: Graphic Layer Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Graphic Layer Sequence	0070,0060	SQ		ALWAYS	AUTO	
>Graphic Layer	0070,0002	CS	VFGFX	ALWAYS	AUTO	
>Graphic Layer Order	0070,0062	IS		ALWAYS	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
>Graphic Layer Recommended Display RGB Value	0070,0067	US	FFFF\FFFF\FFFF	ANAP	AUTO	
>Graphic Layer Description	0070,0068	LO	ViewForum Graphics	ANAP	AUTO	

Table 100: Softcopy Presentation LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Presentation LUT Sequence	2050,0010	SQ		ANAP	AUTO	
>LUT Descriptor	0028,3002	US		ALWAYS	AUTO	
>LUT Data	0028,3006	US		ALWAYS	AUTO	
Presentation LUT Shape	2050,0020	CS	IDENTITY	ANAP	AUTO	

Table 101: Softcopy VOI LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Softcopy VOI LUT Sequence	0028,3110	SQ		ALWAYS	AUTO	
>Referenced Image Sequence	0008,1140	SQ		ANAP	AUTO	
>>Referenced SOP Class UID	0008,1150	UI	1.3.46.670589.2.3.1.1	ALWAYS	FIXED	
>>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	COPY	
>Window Center	0028,1050	DS		ALWAYS	AUTO	
>Window Width	0028,1051	DS		ALWAYS	AUTO	

Table 102: Presentation State Identification Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Content Label	0070,0080	CS	AS ACQUIRED, AS LAST SEEN, NEW AT IMPORT	ALWAYS	AUTO	
Content Description	0070,0081	LO		VNAP	USER	
Presentation Creation Date	0070,0082	DA		ALWAYS	AUTO	
Presentation Creation Time	0070,0083	TM		ALWAYS	AUTO	
Content Creator's Name	0070,0084	PN		VNAP	USER	

Table 103: Presentation State Relationship Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Referenced Series Sequence	0008,1115	SQ		ALWAYS	AUTO	
>Referenced Image Sequence	0008,1140	SQ		ALWAYS	AUTO	
>>Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.5.1.4.1 .1.12.2, 1.3.46.670589.2.3.1.1	ALWAYS	AUTO	
>>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	COPY	
>Series Instance UID	0020,000E	UI		ALWAYS	COPY	

Table 104: Presentation State Shutter Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Shutter Presentation Value	0018,1622	US		ANAP	AUTO	

Table 105: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS	ISO_IR 100	ANAP	IMPLICIT	Configuration issue.
SOP Class UID	0008,0016	UI		ALWAYS	FIXED	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	

8.1.1.3. X-Ray Radiofluoroscopic Image Storage SOP Class

Table 106: IOD of Created X-Ray Radiofluoroscopic Image Storage SOP Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Study	General Study Module	ALWAYS
Series	General Series Module	ALWAYS
Equipment	General Equipment Module	ALWAYS
Image	General Image Module	ALWAYS
	Image Pixel Module	ALWAYS
	Cine Module	ALWAYS
	Multi-Frame Module	ALWAYS
	Display Shutter Module	CONDITIONAL
	X-Ray Image Module	ALWAYS
	X-Ray Acquisition Module	ALWAYS
	XRF Positioner Module	ALWAYS
	VOI LUT Module	CONDITIONAL
	SOP Common Module	ALWAYS

Table 107: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN		ALWAYS	MWL/ USER	
Patient ID	0010,0020	LO		VNAP	MWL/ USER	
Patient's Birth Date	0010,0030	DA		VNAP	MWL/ USER	
Patient's Sex	0010,0040	CS		VNAP	MWL/ USER	

Table 108: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Study Date	0008,0020	DA		ALWAYS	AUTO	
Study Time	0008,0030	TM		ALWAYS	AUTO	
Accession Number	0008,0050	SH		VNAP	MWL	
Referring Physician's Name	0008,0090	PN		VNAP	MWL	
Study Description	0008,1030	LO		VNAP	AUTO	
Referenced Study Sequence	0008,1110	SQ		ANAP	MWL	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	MWL	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	MWL	
Study Instance UID	0020,000D	UI		ALWAYS	MWL	
Study ID	0020,0010	SH		ALWAYS	AUTO	

Table 109: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		VNAP	AUTO	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Time	0008,0031	TM		VNAP	AUTO	
Modality	0008,0060	CS	RF	ALWAYS	FIXED	
Performing Physician's Name	0008,1050	PN		VNAP	MWL/ CONFIG	Current physician
Referenced Performed Procedure Step Sequence	0008,1111	SQ		ANAP	AUTO	
>Referenced SOP Class UID	0008,1150	UI	1.2.840.10008.3.1.2.3.3	ALWAYS	FIXED	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	MPPS	
Protocol Name	0018,1030	LO		ANAP	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		VNAP	AUTO	
Laterality	0020,0060	CS		VNAP	AUTO	Presence defined per EPX.
Performed Procedure Step Start Date	0040,0244	DA		VNAP	AUTO	
Performed Procedure Step Start Time	0040,0245	TM		VNAP	AUTO	
Performed Procedure Step ID	0040,0253	SH		ANAP	AUTO	
Performed Procedure Step Description	0040,0254	LO		VNAP	MWL/ USER	
Request Attributes Sequence	0040,0275	SQ		ANAP	AUTO	
>Scheduled Procedure Step Description	0040,0007	LO		ANAP	MWL	
>Scheduled Procedure Step ID	0040,0009	SH		ANAP	MWL	Always for FD systems, not for II-TV systems.
>Requested Procedure ID	0040,1001	SH		ALWAYS	MWL	

Table 110: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips Medical Systems	ALWAYS	FIXED	
Institution Name	0008,0080	LO	Hospital	VNAP	CONFIG	Hospital name.
Station Name	0008,1010	SH	RF_System	VNAP	CONFIG	Local system ID.
Manufacturer's Model Name	0008,1090	LO	Extended Digital Imaging	ALWAYS	FIXED	
Device Serial Number	0018,1000	LO	DSI R6.1.1	ALWAYS	FIXED	
Software Version(s)	0018,1020	LO		ALWAYS	FIXED	

Table 111: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Date	0008,0022	DA		ALWAYS	AUTO	
Content Date	0008,0023	DA		ANAPCV	AUTO	
Acquisition Time	0008,0032	TM		ALWAYS	AUTO	
Content Time	0008,0033	TM		ANAPCV	AUTO	
Acquisition Number	0020,0012	IS		ALWAYS	AUTO	
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Patient Orientation	0020,0020	CS		VNAP	AUTO	

Table 112: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Rows	0028,0010	US	512, 1024	ALWAYS	IMPLICIT	
Columns	0028,0011	US	512, 1024	ALWAYS	IMPLICIT	
Pixel Data	7FE0,0010	O W/ OB		ALWAYS	IMPLICIT	

Table 113: Cine Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Cine Rate	0018,0040	IS		ALWAYS	IMPLICIT	
Frame Time	0018,1063	DS		ALWAYS	IMPLICIT	

Table 114: Multi-Frame Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Frame Increment Pointer	0028,0009	AT	0x00181063	ALWAYS	FIXED	

Table 115: Display Shutter Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Shutter Shape	0018,1600	CS	CIRCULAR, RECTANGULAR	ALWAYS	FIXED	CIRCULAR applicable for II-TV systems only.
Shutter Left Vertical Edge	0018,1602	IS		ANAP	IMPLICIT	
Shutter Right Vertical Edge	0018,1604	IS		ANAP	IMPLICIT	
Shutter Upper Horizontal Edge	0018,1606	IS		ANAP	IMPLICIT	
Shutter Lower Horizontal Edge	0018,1608	IS		ANAP	IMPLICIT	
Center of Circular Shutter	0018,1610	IS		ANAP	IMPLICIT	Applicable for II-TV systems only.
Radius of Circular Shutter	0018,1612	IS		ANAP	IMPLICIT	Applicable for II-TV systems only.

Table 116: X-Ray Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	ORIGINAL\PRIMARY\ SINGLE PLANE	ALWAYS	FIXED	
Samples per Pixel	0028,0002	US	1	ALWAYS	FIXED	
Photometric Interpretation	0028,0004	CS	MONOCHROME2	ALWAYS	FIXED	
Bits Allocated	0028,0100	US	II-TV: 8; FD: 16	ALWAYS	FIXED	
Bits Stored	0028,0101	US	II-TV: 8; FD: 14	ALWAYS	FIXED	
High Bit	0028,0102	US	II-TV: 7; FD: 13	ALWAYS	FIXED	
Pixel Representation	0028,0103	US	0000	ALWAYS	FIXED	
Pixel Intensity Relationship	0028,1040	CS	DISP	ALWAYS	FIXED	

Table 117: X-Ray Acquisition Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
KVP	0018,0060	DS		ALWAYS	IMPLICIT	Range 40 to 125 kV.
Exposure Time	0018,1150	IS		ANAPCV	IMPLICIT	

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
X-Ray Tube Current	0018,1151	IS		ANAPCV	IMPLICIT	
Exposure	0018,1152	IS		ANAPCV	IMPLICIT	
Radiation Setting	0018,1155	CS		ALWAYS	IMPLICIT	

Table 118: XRF Positioner Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Distance Source to Detector	0018,1110	DS		ALWAYS	AUTO	In range 95 to 125 cm.

Table 119: VOI LUT Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Window Center	0028,1050	DS	8191.5	ALWAYS	AUTO	
Window Width	0028,1051	DS	16383.0	ALWAYS	AUTO	

Table 120: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Specific Character Set	0008,0005	CS	ISO_IR 100	ANAP	IMPLICIT	Configuration issue.
SOP Class UID	0008,0016	UI		ALWAYS	FIXED	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	

8.1.2. Usage of Attributes from Received IOD's

The following remarks apply for RWA Storage of the ACP AE.

If the Eleva imports an image and during the association negotiation the Presentation State SOP class was not negotiated, then the Eleva creates a Presentation State SOP instance for the imported image.
The following table gives an overview of the image formats that can be viewed or stored.

Table 121: Support for Photometric Interpretation

Photometric Interpretation	Storage	Viewing
MONOCHROME1	Yes	Yes
MONOCHROME2	Yes	Yes
RGB	Yes	Yes
YBR_FULL	Yes	No
YBR_FULL_422	Yes*	Yes*
YBR_PARTIAL_422	Yes	No
PALETTE COLOR	Yes	No
other	Yes	No

* Compressed YBR_FULL_422 images received per JPEG Baseline transfer are stored (and consequently viewed) as RGB images.

If the Eleva receives improper DICOM, the Eleva tries as much as possible to make it proper DICOM (if configured to do so).
The Eleva also tries to remain as transparent as possible on images; on export the images must be changed only to such extend as really necessary. Therefore it is not guaranteed that all DICOM violations of incoming images are repaired (e.g. enumerated values are not changed).
Thus improper DICOM import may result in improper DICOM export from the Eleva (no checks are available for incorrect UID's, Date/Time formats, etc.).

The Eleva stores all additional standard, private and retired attributes in received images. Retrieval of these attributes VR's is only possible (by means of a C-STORE) if the following conditions are satisfied:

- The image was encoded (when the Eleva was C-STORE SCP) using one of the explicit value representations; or
- The image was encoded (when the Eleva was C-STORE SCP) using implicit value representation and the destination (i.e. a remote C-STORE SCP) has accepted implicit value representation as the only transfer syntax applicable to the storage SOP class of the image (with the Eleva as C-STORE SCU).

Otherwise the VR will be set to Unknown (UN).

Important implementation remarks and restrictions:

- See section 8.1.4 Coerced/Modified fields for details on coerced and modified attributes.
- When the location of a Graphic or Text Annotation is specified relatively with regards to the displayed area. (i.e. DICOM attribute: Bounding Box Annotation Units (0070,0003), Anchor Point Annotation Units (0070,0004) or Graphic Annotation Units (0070,0005) equals "DISPLAY"), the annotation is not displayed.
- Areas occluded by shutter are always black in the Eleva, whereas it is possible to want it to be white in DICOM.

- On the export of imported images the Eleva adds private attributes to the image.
- The Eleva does NOT support IVUS (IntraVascular UltraSound) Ultrasound images.
- If during the image transfer the Presentation State instances are transferred before the images, the Eleva changes the content of the images.

Support for additional standard, private and retired attributes:
The Eleva stores all additional standard, private, and retired attributes in received images. Retrieval of these attributes is only possible (by means of a C-MOVE request) if the following conditions are satisfied:

- The image was encoded (when the Eleva was C-STORE SCP) using one of the explicit value representations; or
- The image was encoded (when the Eleva was C-STORE SCP) using implicit value representation and the move destination (i.e. a C-STORE SCP) has accepted implicit value representation as the only transfer syntax applicable to the storage SOP class of the image (then the Eleva is C-STORE SCU).

8.1.3. Attribute Mapping

The following table shows the relation between BWLM and MPPS and image storage attributes.

Table 122: Attribute Mapping of Modality Workflow

Attribute Name	BWLM Tag	MPPS		Image IOD Tag
		Create Tag	Set Tag	
Specific Character Set	0008,0005	-	-	0008,0005
Accession Number	0008,0050	0008,0050	-	0008,0050
Modality	0008,0060	0008,0060	-	0008,0060
Referring Physician's Name	0008,0090	-	-	0008,0090
Referenced Study Sequence	0008,1110	0008,1110	-	0008,1110
Referenced Image Sequence Referenced Non-Image Composite SOP Instance Sequence	-	-	0008,1140 0040,0220	-
> Referenced SOP Class UID SOP Class UID	-	-	0008,1150	0008,0016
> Referenced SOP Instance UID SOP Instance UID	-	-	0008,1155	0008,0018
Patient's Name	0010,0010	0010,0010	-	0010,0010
Patient ID	0010,0020	0010,0020	-	0010,0020
Issuer of Patient ID	0010,0021	0010,0021	-	-
Patient's Birth Date	0010,0030	0010,0030	-	0010,0030
Patient's Sex	0010,0040	0010,0040	-	0010,0040
KVP	-	-	0018,0060	0018,0060
Protocol Name	-	-	0018,1030	0018,1030
Study Instance UID	0020,000D	0020,000D	-	0020,000D
Series Instance UID	-	-	0020,000E	0020,000E
Study ID	-	0020,0010	-	0020,0010
Requested Procedure Description	0032,1060	0032,1060	-	-
Requested Procedure Code Sequence Procedure Code Sequence	0032,1064	0008,1032	0008,1032	-
Scheduled Performing Physician's Name Performing Physician's Name	0040,0006	-	0008,1050	0008,1050
Scheduled Procedure Step Description	0040,0007	0040,0007		0040,0007
Performed Procedure Step Description		0040,0254	0040,0254	0040,0254
Scheduled Protocol Code Sequence	0040,0008	0040,0008		0040,0008*

Attribute Name	BWLM Tag	MPPS		Image IOD Tag
		Create Tag	Set Tag	
Performed Protocol Code Sequence			0040,0260	
Scheduled Procedure Step ID	0040,0009	0040,0009	-	0040,0009
Performed Procedure Step Start Date	-	0040,0244	-	0040,0244
Performed Procedure Step Start Time	-	0040,0245	-	0040,0245
Performed Procedure Step ID	-	0040,0253	-	0040,0253
Requested Procedure ID	0040,1001	0040,1001	-	0040,1001

* II-TV systems only.

8.1.4. Coerced/Modified fields

In general the Eleva will try and optimize the imported image data. This may involve the removal of redundant data, either or not due to the creation of a Grayscale Softcopy Presentation State object for the image data. This may also involve the creation of extra attributes.

If not available at import then the Eleva will create the additional attributes as listed in the table below.

Table 123: Additional Attributes for Storage

Name	Tag	VR	Generated Value
Performed Procedure Step Start Date	0040,0244	DA	Copied from (0008,0020) Study Date.
Performed Procedure Step Start Time	0040,0245	TM	Copied from (0008,0030) Study Time.
Performed Procedure Step ID	0040,0253	SH	Copied from (0020,0010) Study ID.
Performed Procedure Step Description	0040,0254	LO	Copied from (0008,1030) Study Description.

If the SCU does not propose a Presentation Context for the Grayscale Softcopy Presentation State storage SOP class, then the Eleva will derive Grayscale Softcopy Presentation State data from the imported image data and store this data in a new series within the examination of the imported image.
However, if during import the image is accompanied by Grayscale Softcopy Presentation State data, the Eleva database will avoid data overlap by only storing the relevant data from the first object received; either the first image or its Presentation State!
Thus it will omit data received by succeeding objects concerning the optional attributes (VT=3) listed in Table 124, and clear all mandatory attributes (VT=2) listed in Table 125.

Table 124: Omitted Attributes for Storage

Name	Tag	VR	Comment
Patient Module			
Referenced Patient Sequence	0008,1120	SQ	
Patient's Birth Time	0010,0032	TM	
Other Patient's ID's	0010,1000	LO	
Other Patient's Names	0010,1001	PN	
Ethnic Group	0010,2160	SH	
Patient Comments	0010,4000	LT	
General Study Module			
Referring Physician Identification Sequence	0008,0096	SQ	

Name	Tag	VR	Comment
Study Description	0008,1030	LO	
Procedure Code Sequence	0008,1032	SQ	
Physician(s) of Record	0008,1048	PN	
Physician(s) of Record Identification Sequence	0008,1049	SQ	
Name of Physician(s) Reading Study	0008,1060	PN	
Physician(s) Reading Study Identification Sequence	0008,1062	SQ	
Referenced Study Sequence	0008,1110	SQ	
Patient Study Module			
Admitting Diagnoses Description	0008,1080	LO	
Admitting Diagnoses Code Sequence	0008,1084	SQ	
Patient's Age	0010,1010	AS	
Patient's Size	0010,1020	DS	
Patient's Weight	0010,1030	DS	
Occupation	0010,2180	SH	
Additional Patient's History	0010,21B0	LT	
Clinical Trial Study Module			
Clinical Trial Time Point Description	0012,0051	ST	
General Series Module			
Series Date	0008,0021	DA	
Series Time	0008,0031	TM	
Series Description	0008,103E	LO	
Performing Physicians' Name	0008,1050	PN	
Performing Physician Identification Sequence	0008,1052	SQ	
Operators' Name	0008,1070	PN	
Operators Identification Sequence	0008,1072	SQ	
Referenced Performed Procedure Step Sequence	0008,1111	SQ	
Body Part Examined	0018,0015	CS	
Protocol Name	0018,1030	LO	
Smallest Pixel Value in Series	0028,0108	US/SS	
Largest Pixel Value in Series	0028,0109	US/SS	
Performed Procedure Step Start Date	0040,0244	DA	
Performed Procedure Step Start Time	0040,0245	TM	
Performed Procedure Step ID	0040,0253	SH	
Performed Procedure Step Description	0040,0254	LO	
Performed Protocol Code Sequence	0040,0260	SQ	
Request Attributes Sequence	0040,0275	SQ	
Comments on the Performed Procedure Step	0040,0280	ST	
General Equipment Module			
Institution Name	0008,0080	LO	
Institution Address	0008,0081	SH	
Station Name	0008,1010	SH	
Institutional Department Name	0008,1040	LO	
Manufacturer's Model Name	0008,1090	LO	
Device Serial Number	0018,1000	LO	
Software Version(s)	0018,1020	LO	
Spatial Resolution	0018,1050	DS	
Date of Last Calibration	0018,1200	DA	
Time of Last Calibration	0018,1201	TM	
Pixel Padding Value	0028,0120	US/SS	
Display Shutter Module			
Shutter Presentation Value	0018,1622	US	

Name	Tag	VR	Comment
Overlay Plane Module			
Overlay Description	60xx,0022	LO	
Overlay Subtype	60xx,0045	LO	
ROI Area	60xx,1301	IS	
ROI Mean	60xx,1302	DS	
ROI Standard Deviation	60xx,1303	DS	
Overlay Label	60xx,1500	LO	
SOP Common Module			
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	
Timezone Offset From UTC	0008,0201	SH	
Contributing Equipment Sequence	0018,A001	SQ	
Instance Number	0020,0013	IS	
SOP Instance Status	0100,0410	CS	
SOP Authorization Date and Time	0100,0420	DT	
SOP Authorization Comment	0100,0424	LT	
Authorization Equipment Certification Number	0100,0426	LO	
MAC Parameters Sequence	4FFE,0001	SQ	
Digital Signatures Sequence	FFFA,FFFA	SQ	

Table 125: Cleared Attributes for Storage

Name	Tag	VR	Comment
Patient Module			
Patient's Name	0010,0010	PN	
Patient ID	0010,0020	LO	
Patient's Birth Date	0010,0030	DA	
Patient's Sex	0010,0040	CS	
Clinical Trial Subject Module			
Clinical Trial Protocol Name	0012,0021	LO	
Clinical Trial Site ID	0012,0030	LO	
Clinical Trial Site Name	0012,0031	LO	
General Study Module			
Study Date	0008,0020	DA	
Study Time	0008,0030	TM	
Accession Number	0008,0050	SH	
Referring Physician's Name	0008,0090	PN	
Study ID	0020,0010	SH	
Clinical Trial Study Module			
Clinical Trial Time Point ID	0012,0050	LO	
General Series Module			
Series Number	0020,0011	IS	
Laterality	0020,0060	CS	
Clinical Trial Series Module			
Clinical Trial Coordinating Center Name	0012,0060	LO	
General Equipment Module			
Manufacturer	0008,0070	LO	
Mask Module			
Recommended Viewing Mode	0028,1090	CS	
Overlay/Curve Activation Module			
Curve Activation Layer	50xx,1001	CS	

Name	Tag	VR	Comment
Overlay Activation Layer	60xx,1001	CS	

The Eleva allows the operator to modify attributes of the stored images; see Table 126.
The Eleva does not modify the pixel values of the stored images.
Modified images retain their original Study, Series and Image UID.

Table 126: Modifiable Attributes

Name	Tag	VR	Comment
Patient			
Patient's Name	0010,0010	PN	
Patient ID	0010,0020	LO	
Patient's Birth Date	0010,0030	DA	
Patient's Sex	0010,0040	CS	
Medical Alerts	0010,2000	LO	
Contrast Allergies	0010,2110	LO	
Patient Comments	0010,4000	LT	
Study			
Accession Number	0008,0050	SH	
Referring Physician's Name	0008,0090	PN	
Study Description	0008,1030	LO	
Physician(s) of Record	0008,1048	PN	
Name of Physician(s) Reading Study	0008,1060	PN	
Admitting Diagnoses Description	0008,1080	LO	
Patient's Age	0010,1010	AS	
Occupation	0010,2180	SH	
Additional Patient History	0010,21B0	LT	
Examination			
Performed Station Name	0040,0242	SH	
Performed Location	0040,0243	SH	
Performed Procedure Step Description	0040,0254	LO	
Performed Procedure Type Description	0040,0255	LO	
Comments on the Performed Procedure Step	0040,0280	ST	

8.2. Data Dictionary of Private Attributes

Not applicable.

8.3. Coded Terminology and Templates

Not applicable.

8.4. Grayscale Image consistency

The high-resolution display monitor attached to the product can be calibrated by using the service tool together with a light probe. See the [VFRB] for details on the calibration procedure.

8.5. Standard Extended/Specialized/Private SOPs

8.5.1. Standard Extended SOP Classes

The standard DICOM SOP classes may be extended with additional attributes:

- Standard attributes of other SOP Classes – the presence of these attributes in exported images can be configured, see section 4.2.2.3.1.3.3;
- Retired (from ACR NEMA 1.0 or 2.0) attributes – the presence of these attributes in exported images can be configured, see section 4.2.2.3.1.3.3;
- Private attributes – the presence of these attributes in exported images can be configured, see section 4.2.2.3.1.3.3.

8.5.2. Standard Specialized SOP Classes

Table 127 lists the supported specialized SOP classes. These SOP classes are only to be used in the Eleva domain.
However instances of these specialized SOP Classes may be exported towards a PACS environment and stored in a (central) DICOM archive; if required, then the support of the relevant SOP classes should be configured.

Table 127: Specialized SOP classes of the Eleva System

SOP Class Name	SOP Class UID
Specialized PMS X-Ray Image Store	1.3.46.670589.2.3.1.1
XA Reconstructed X-Ray	1.3.46.670589.2.4.1.1
3D Volume Storage	1.3.46.670589.5.0.1.1
3D Object Storage	1.3.46.670589.5.0.2.1
Surface Storage	1.3.46.670589.5.0.3.1
Cardio Image Storage	1.3.46.670589.5.0.8.1
CT Synthetic Image Storage	1.3.46.670589.5.0.9
MR Synthetic Image Storage	1.3.46.670589.5.0.10
MR Cardio Analysis Storage	1.3.46.670589.5.0.11.1
CX Synthetic Image Storage	1.3.46.670589.5.0.12
Perfusion	1.3.46.670589.5.0.13
Perfusion Image Storage	1.3.46.670589.5.0.14

8.6. Private Transfer Syntaxes

None.