DICOM
Conformance Statement

EP Navigator
– Release 1.0
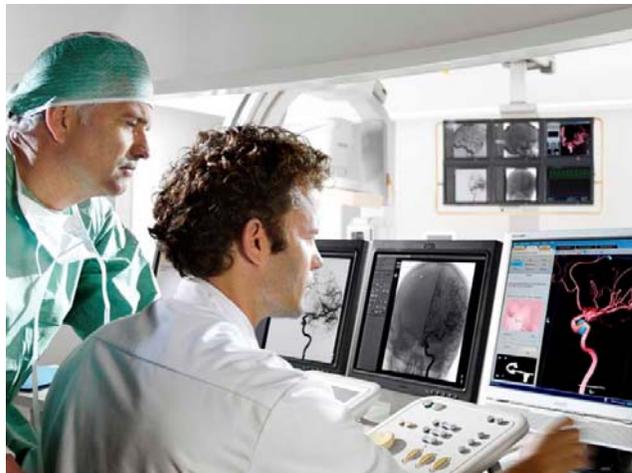
PHILIPS

1. DICOM CONFORMANCE STATEMENT OVERVIEW

EP Navigator is a system (consisting of both hardware and software included) for Cardiac Cathlab applications used along with one of the following systems: Allura-Xper FD-10, FD-10/10 and FD-20/10. DICOM data (CT volume data) can be pushed from external workstation/PACS towards the EP Navigator system. The EP Navigator system stores the data in the local data repository. In order to be able to import DICOM data, the EP Navigator system provides DICOM storage as SCP.

A table of Supported Networking DICOM Service (SOP) Classes is provided with roles (User/Provider)

The EP Navigator system is designed to process CT images and use them for EP applications. In addition to that it can receive other data sets like MR, US, etc. However they are not used by the EP Navigator system, they are received to support multi-modality study import. The EP Navigator system can send screenshot images as Secondary Capture images to PACS. Also the EP Navigator system can Query and Retrieve study info for a specific patient from a PACS. The EP Navigator system consists of Navigator work station and EP Cockpit snapshot functionality.

The EP Navigator system supports the following DICOM functionality.
- DICOM import functionality
- DICOM export functionality
- DICOM Query/Retrieve functionality.
- DICOM Verification functionality.
- DICOM Storage Commitment Push Model as SCU
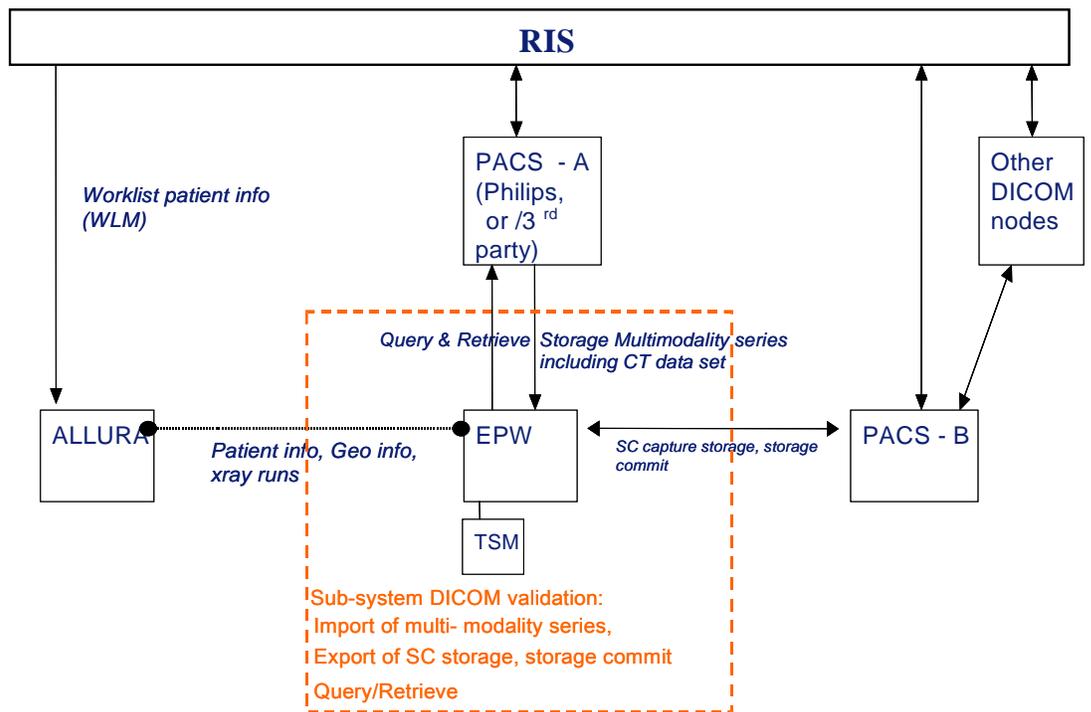
Figure 1: EP Navigator system context regarding DICOM connectivity interfaces

Note:
- *EP Navigator Query/Retrieves or Imports CT data sets from PACS – A*
- *EP Navigator Exports Secondary Capture Images to PACS – B*
- *There can be instances, where EP Navigator can interact with a single PACS for Query/Retrieve or Import of CT data sets and Export Secondary Capture Images.*

Table 1: Network Services

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	**UID**		
Other			
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes
Query/Retrieve			
Patient Root Query/Retrieve Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Patient Root Query/Retrieve Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Study Root Query/Retrieve Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Study Root Query/Retrieve Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Yes	No
Transfer			
12-Lead ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.1	No	Yes
Ambulatory ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.3	No	Yes
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	No	Yes
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	No	Yes
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	No	Yes
Hemodynamic Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.2.1	No	Yes
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	No	Yes
Multi-frame Grayscale Byte SC Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.2	No	Yes
Multi-frame Grayscale Word SC Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.3	No	Yes
Multi-frame Single Bit Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.1	No	Yes
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	No	Yes
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	No	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	No	Yes
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	No	Yes
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	No	Yes
Workflow Management			
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No

The services can be specified as a SCU, SCP or as an Option, which means that it is either configurable or that it can be purchased separately.

No Media Storage Application profiles are supported by EP Navigator system.

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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 2: Revision History

Document Version	Date of Issue	Author	Description
00	01 January 2006	PMS CTO C&S IC2	Template for the DICOM Conformance Statement (Ref. DICOM Standard PS 3.2 - Conformance)
01	17 August 2006	PMS CTO C&S IC2	The draft version of DICOM Conformance Statement (Ref. DICOM Standard PS 3.2 - Conformance) based on version 00
02	10 October 2006	PMS CTO C&S IC2	The first release version of DICOM Conformance Statement (Ref. DICOM Standard PS 3.2 - Conformance) based on the review feedback and DICOM testing of the EPW system 1). Removed the SOP class - Basic Cardiac ECG waveform Storage. 2).Added the following SOP classes. • Computed Radiography Image Storage • Nuclear Medicine Image Storage • Ambulatory ECG waveform Storage 3). Added the service - Storage Commitment Push model service as SCU.
03	20 October 2006	PMS CTO C&S IC2	Corrections to the first release version based on the review feedback from the EPW team
04	24 October 2006	PMS CTO C&S IC2	Based on the request from the Product group name "Electro-Physiology Work Spot" changed to "EP Navigator"
05	4 December 2006	PMS CTO C&S IC2	Implementation version name changed from 'EPW 1.0' to 'EP Navigator 1.0' based on the request from the Product group.

3.2.   Audience

This 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 NEMA PS 3.3 and PS 3.4.
The word Philips in this document refers to Philips Medical Systems.

The following acronyms and abbreviations are used in this document.

AE	Application Entity
ANSI	American National Standard Institute
AP	Application Profile
CR	Computed Radiography
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DIMSE-Composite
DIMSE-N	DIMSE-Normalized
EBE	DICOM Explicit VR Big Endian
ELE	DICOM Explicit VR Little Endian
EP Navigator	Electro Physiology Navigator
GUI	Graphic User Interface
ILE	DICOM Implicit VR Little Endian
IOD	Information Object Definition
ISIS	Information System – Imaging System
MOD	Magneto-Optical Disk
MPPS	Modality Performed Procedure Step

MR	Magnetic Resonance
NEMA	National Electrical Manufacturers Association
NM	Nuclear Medicine
PACS	Picture Archival and Communication System
PDU	Protocol Data Unit
RF	X-Ray Radiofluoroscopic
RIS	Radiology Information System
RT	Radiotherapy
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
TSM	Touch Screen Module
UID	Unique Identifier
US	Ultrasound
USMF	Ultrasound Multi-frame
WLM	Work list Management
XA	X-Ray Angiographic

Note:
The name "Electro-Physiology Work Spot" changed to "EP Navigator". The term "EPW" in rest of the document refers to EP Navigator.

3.5.   References

[DICOM]   Digital Imaging and Communications in Medicine, 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
Internet: http://medical nema.org/
Note that at any point in time the official standard consists of the most recent yearly edition of the base standard (currently 2004) plus all the supplements and correction items that have been approved as Final Text.

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 EP Navigator system provides
- DICOM import functionality
- DICOM export functionality
- DICOM Query/ Retrieve functionality
- DICOM Verification functionality.
- DICOM Storage Commitment Push Model as SCU
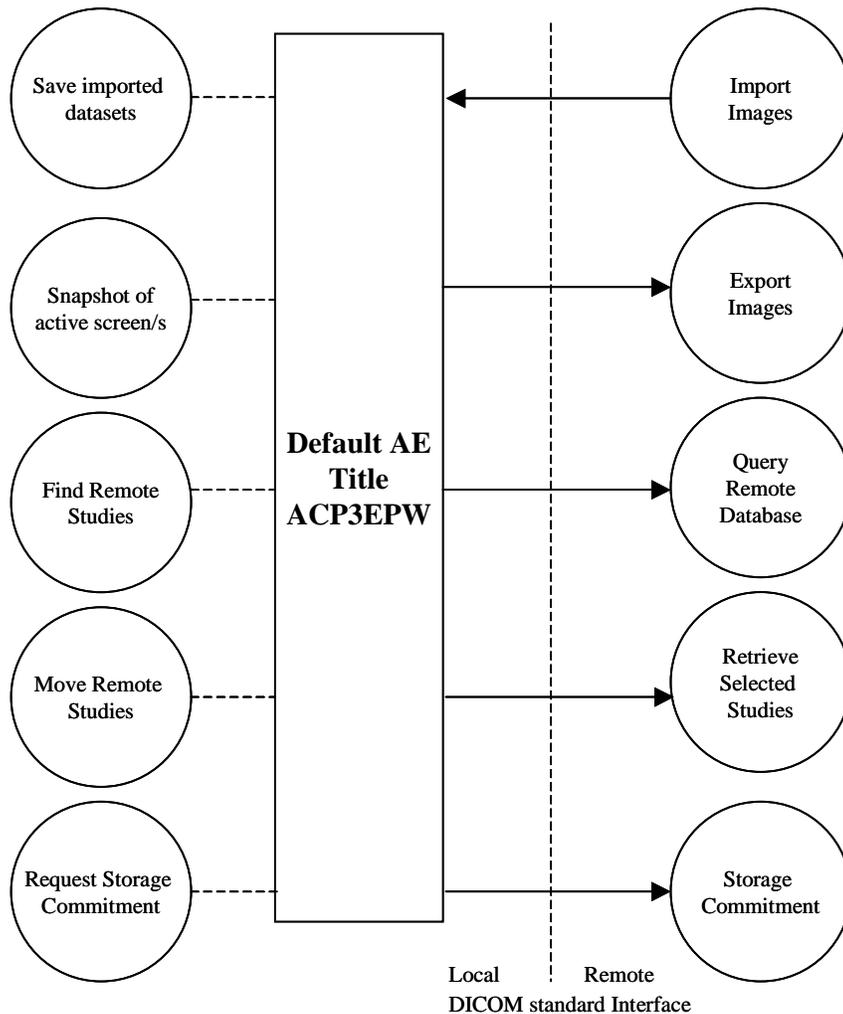
Figure 2: Application Data Flow Diagram

4.1.2. Functional Definition of AE's

This section contains a functional definition for each individual local Application Entity. This describes in general terms the functions to be performed by the AE, and the DICOM services used to accomplish these functions. In this sense, "DICOM services" refers not only to DICOM Service Classes, but also to lower level DICOM services, such as Association Services.

4.1.2.1. Functional Definition of ACP3EPW

This section describes in general terms the functions to be performed by the ACP3EPW Application Entity and the DICOM services used to accomplish these functions. ACP3EP Navigator provides the following DICOM services.

- DICOM Import
- DICOM Export
- DICOM Query/Retrieve
- DICOM Verification
- DICOM Storage Commitment

4.1.3. Sequencing of Real World Activities

This section contains a description of sequencing as well as potential constraints of Real-World Activities, including any applicable user interactions, as performed by ACP3EPW Application Entity.
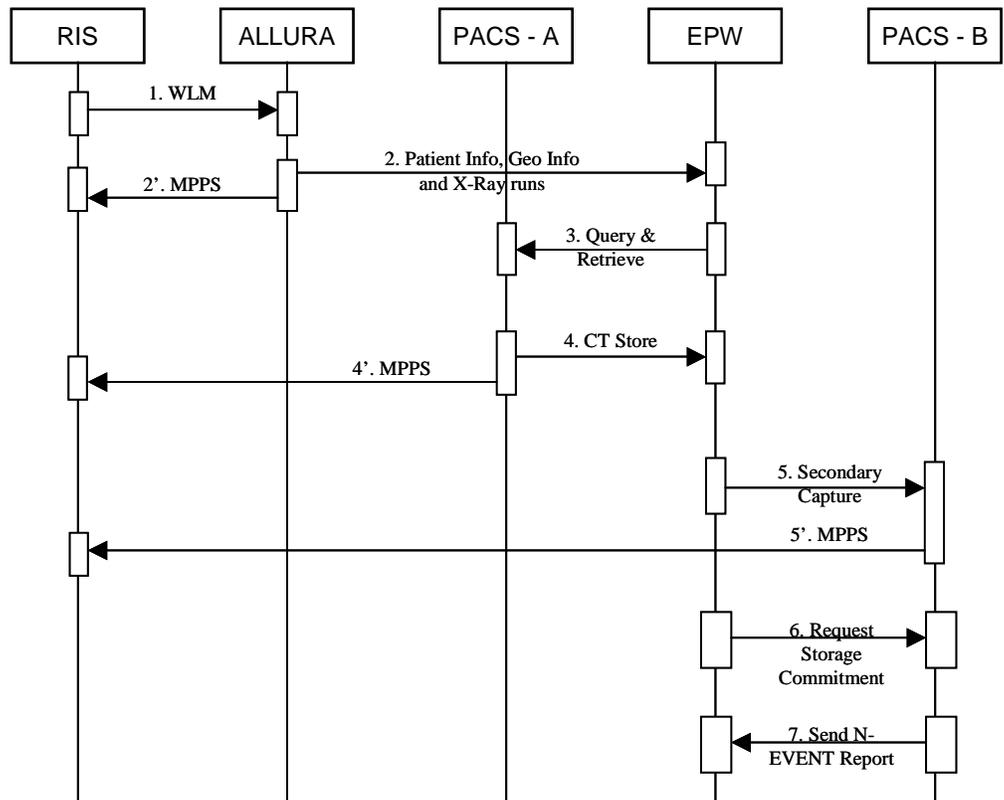
Figure 3: Sequencing of Real world Activities between EP Navigator system and PACS

Note:
- *EP Navigator Query/Retrieves or Imports CT data sets from PACS – A*
- *EP Navigator Exports Secondary Capture Images to PACS – B*
- *There can be instances, where EP Navigator can interact with a single PACS for Query/Retrieve or Import of CT data sets and Export Secondary Capture Images.*

4.2. AE Specifications

The next section in the DICOM Conformance Statement is a set of application entity specifications. There are as many of these subsections as there are different AE's in the implementation.

4.2.1. ACP3EPW

Detail of this specific Application Entity is specified in this section.

4.2.1.1. SOP Classes

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

Table 3: SOP Classes for ACP3EPW

| SOP Class Name	SOP Class UID	SCU	SCP
12-Lead ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.1	No	Yes
Ambulatory ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.3	No	Yes
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	No	Yes
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	No	Yes
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	No	Yes
Hemodynamic Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.2.1	No	Yes
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	No	Yes
Multi-frame Grayscale Byte SC Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.2	No	Yes
Multi-frame Grayscale Word SC Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.3	No	Yes
Multi-frame Single Bit Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.1	No	Yes
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	No	Yes
Patient Root Query/Retrieve Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Yes	No
Patient Root Query/Retrieve Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Yes	No
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	No	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	No	Yes
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No
Study Root Query/Retrieve Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Study Root Query/Retrieve Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Yes	No
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
Verification SOP Class	1.2.840.10008.1.1	No	Yes
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	No	Yes
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	No	Yes

Note: Any SOP specific behavior is documented later in the conformance statement in the applicable SOP specific conformance section.

4.2.1.2. Association Policies

Each AE specification contains a description of the general association establishment and acceptance policies of the AE.

4.2.1.2.1. General

The DICOM standard application context has specified.

Table 4: 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 Initiator or Acceptor is specified.

Table 5: Number of Associations as an Association Initiator for ACP3EPW

Maximum number of simultaneous associations	10

Table 6: Number of Associations as an Association Acceptor for ACP3EPW

Maximum number of simultaneous associations	10

4.2.1.2.3. Asynchronous Nature

If the implementation supports negotiation of multiple outstanding transactions this is stated here, along with the maximum number of outstanding transactions supported.

Table 7: Asynchronous Nature as an Association Initiator for ACP3EPW

Maximum number of outstanding asynchronous transactions	1

4.2.1.2.4. Implementation Identifying Information

The value supplied for Implementation Class UID and version name are documented here.

Table 8: DICOM Implementation Class and Version for ACP3EPW

Implementation Class UID	1.3.46.670589.38.1.1.0
Implementation Version Name	EP Navigator 1.0

4.2.1.2.5. Communication Failure Handling

The behavior of the AE during communication failure is summarized in next table.

Table 9: Communication Failure Behavior

Exception	Behavior
ARTIM Timeout	Association setup fails. The reason is logged.

4.2.1.3. Association Initiation Policy

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

The behavior of the AE during association rejection is summarized in next table

Table 10: 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 error is logged.
		2 – application-context-name-not-supported	Association is not established. The error is logged.
		3 – calling-AE-title-not-recognized	Association is not established. The error is logged.

Result	Source	Reason/Diagnosis	Behavior
		7 – called-AE-title-not-recognized	Association is not established. The error is logged.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established. The error is logged.
		2 – protocol-version-not-supported	Association is not established. The error is logged.
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Association is not established. The error is logged.
		2 – local-limit-exceeded	Association is not established. The error is logged.
2 – rejected-transient	1 – DICOM UL service-user	1 – no-reason-given	Association is not established. The error is logged.
		2 – application-context-name-not-supported	Association is not established. The error is logged.
		3 – calling-AE-title-not-recognized	Association is not established. The error is logged.
		7 – called-AE-title-not-recognized	Association is not established. The error is logged.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established. The error is logged.
		2 – protocol-version-not-supported	Association is not established. The error is logged.
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Association is not established. The error is logged.
		2 – local-limit-exceeded	Association is not established. The error is logged.

The behavior of the AE on receiving an association abort is summarized in next table

Table 11: DICOM Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	Application terminates the connection. Error is logged
2 – DICOM UL service-provider	0 – reason-not-specified	Application terminates the connection. Error is logged
	1 – unrecognized-PDU	Application terminates the connection. Error is logged
	2 – unexpected-PDU	Application terminates the connection. Error is logged
	4 – unrecognized-PDU parameter	Application terminates the connection. Error is logged
	5 – unexpected-PDU parameter	Application terminates the connection. Error is logged
	6 – invalid-PDU-parameter value	Application terminates the connection. Error is logged

The behavior of the AE for sending an association abort is summarized in next table.

Table 12: DICOM Association Abort Policies

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	Application terminates the connection. Error is logged
2 – DICOM UL service-provider	0 – reason-not-specified	Application terminates the connection. Error is logged
	1 – unrecognized-PDU	Application terminates the connection. Error is logged
	2 – unexpected-PDU	Application terminates the connection. Error is logged
	4 – unrecognized-PDU parameter	Application terminates the connection. Error is logged

Source	Reason/Diagnosis	Behavior
	5 – unexpected-PDU parameter	Application terminates the connection. Error is logged
	6 – invalid-PDU-parameter value	Application terminates the connection. Error is logged

4.2.1.3.1.   (Real-World) Activity – FIND As SCU

4.2.1.3.1.1. Description and Sequencing of Activities
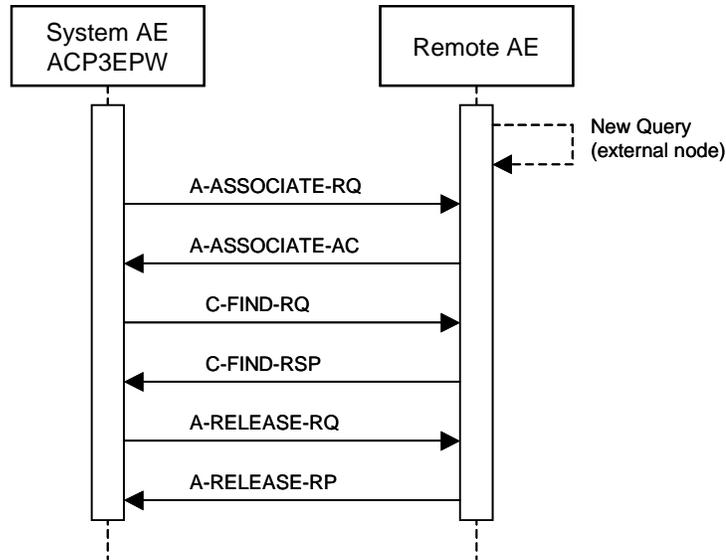
Figure 4: (Real World) Activity - FIND As SCU

The EP Navigator system can query patient study information on a remote system by finding matching patient information on the remote database.

The operator is able to query selected patient study information on a remote database to by means of query button provided in EP Navigator system.

The EP Navigator system initiates for each query request an association to the configured Remote AE and uses it to send the find (C_FIND) request and receive the associated responses.

The association is released after the find responses for the related request have been received.

4.2.1.3.1.2. Proposed Presentation Contexts

Table 13: Proposed Presentation Contexts for (Real-World) Activity – FIND As SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query/Retrieve	1.2.840.10008.5.1.4.1.2.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Information Model - FIND SOP Class		Implicit VR Little Endian	1.2.840.10008.1.2		
Study Root Query/Retrieve Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Big Endian Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

The EP Navigator system is capable of proposing the Presentation Contexts shown in the above table
Extended negotiations are not supported by the EP Navigator system.

4.2.1.3.1.3. SOP Specific Conformance for Patient Root Query/Retrieve Information Model - FIND SOP Class

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
The behavior of an Application Entity SOP class is summarized as shown in next Table. The standard as well as the manufacturer specific status codes and their corresponding behavior is specified.

In Patient Root level model, if a query is made at the patient level and if SCP sends patient level responses to the EP Navigator system, then EP Navigator internally sends a Study level C_FIND_RQ supplying the Patient ID it just received from the C_FIND_RSP, querying for any studies for that patient in the remote database. If there are no studies received for the patient, then that patient details are not listed in the query results on the GUI of EP Navigator system.

4.2.1.3.1.3.1. Dataset Specific Conformance for Patient Root Q/R Information Model - FIND SOP Class SCU

This section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

Table 14: Supported Query Keys for

Attribute Name	Tag	VR	Type Of Matching	Comment
Query/Retrieve Level	0008,0052	CS	Single Value	Patient
Q/R Patient level				
Patient ID	0010,0020	LO	Single Value, Wildcard and Universal	Patient Level
Patient's Name	0010,0010	PN	Single Value, Wildcard and Universal	Patient Level * Note 2
Patient's Birth Date	0010,0030	DA	Single Value	Patient Level
Q/R Study level (Patient Root)				
Patient ID	0010,0020	LO	Single Value	Study Level
Study Instance UID	0020,000D	UI	Universal	Study Level
Study Date	0008,0020	DA	Universal	Study Level
Study Time	0008,0030	TM	Universal	Study Level
Accession Number	0008,0050	SH	Universal	Study Level
Study ID	0020,0010	SH	Universal	Study Level

Note: Though Universal matching is supported for Patient Name and Patient ID attributes at least one of these attributes should have value entered in their field (at least Wild card character) for a query

* Note 2: When maximum query hit limit is exceeded, a message "Query to PACS failed, Is PACS online?" appears.

Table 15: C-FIND-RQ Status Response

Service Status	Code	Further Meaning	Description
Success	0000	Matching is complete	The find results are displayed.
Refused	A700	Out of Resources	No find results are displayed. The reason is logged.
Failed	A900	Identifiers does not match SOP class	No find results are displayed. The reason is logged.
	Cxxx	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 16: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	N/A
Reply Time-out	The query fails and the association is aborted. The reason is logged.
Association Time-out SCU	The association is released.
Association aborted	The query fails. The reason is logged.

4.2.1.3.1.4. SOP Specific Conformance for Study Root Query/Retrieve Information Model - FIND SOP Class

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
The behavior of an Application Entity SOP class is summarized as shown in next Table. The standard as well as the manufacturer specific status codes and their corresponding behavior is specified.

4.2.1.3.1.4.1. Dataset Specific Conformance for Study Root Q/R Information Model - FIND SOP Class SCU

This section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

Table 17: Supported Query Keys for

Attribute Name	Tag	VR	Type Of Matching	Comment
Query/Retrieve Level	0008,0052	CS	Single Value	Study
Q/R Study level (Study Root)				
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	
Patient's Name	0010,0010	PN	Single Value, Wildcard and Universal	

Attribute Name	Tag	VR	Type Of Matching	Comment
Patient ID	0010,0020	LO	Single Value, Wildcard and Universal	
Patient's Birth Date	0010,0030	DA	Single Value	
Study ID	0020,0010	SH	Universal	

Note: Though Universal matching is supported for Patient Name and Patient ID attributes at least one of these attributes should have value entered in their field (at least Wild card character) for a query.

Table 18: C-FIND-RQ Status Response

Service Status	Code	Further Meaning	Description
Success	0000	Matching is complete	The find results are displayed.
Refused	A700	Out of Resources	No find results are displayed. The reason is logged.
Failed	A900	Identifiers does not match SOP class	No find results are displayed. The reason is logged.
	Cxxx	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 19: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	N/A
Reply Time-out	The query fails and the association is aborted. The reason is logged.
Association Time-out SCU	The association is released.
Association aborted	The query fails. The reason is logged.

4.2.1.3.2.　(Real-World) Activity – MOVE As SCU

4.2.1.3.2.1.　Description and Sequencing of Activities
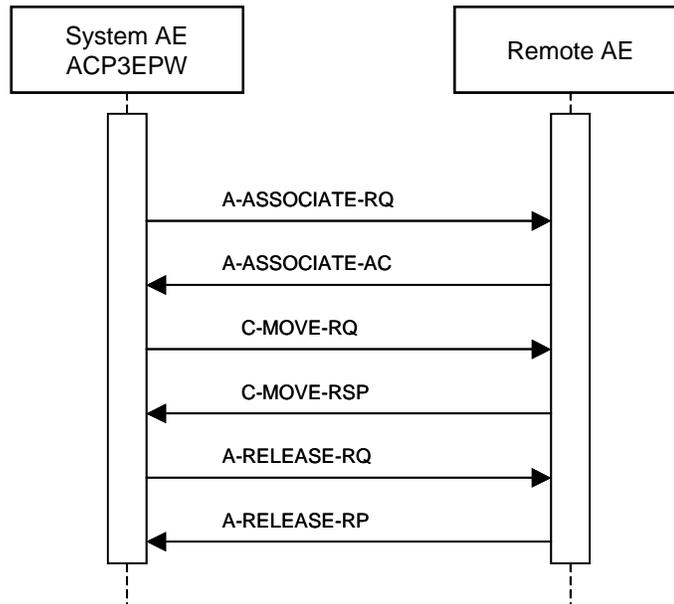
Figure 5: (Real World) Activity - MOVE As SCU

The EP Navigator system can retrieve patient study information from a remote system by supplying matching patient information from the remote database to its local database.

The operator is able to retrieve the matched patient study information from a remote database to local database by means of retrieve button provided by the EP Navigator system.

The EP Navigator system initiates for each retrieve request an association to the configured Remote AE and uses it to send the Retrieve (C_MOVE) request and receive the associated responses. The association is released after the Retrieve responses for the related request has been received.

4.2.1.3.2.2.　Proposed Presentation Contexts

Table 20: Proposed Presentation Contexts for (Real-World) Activity – MOVE As SCU

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Patient Root Query/Retrieve Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Explicit VR Big Endian Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None
Study Root Query/Retrieve Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Big Endian Explicit VR Little Endian Implicit VR Little Endian	1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2	SCU	None

EP Navigator system is capable of proposing the Presentation Contexts shown in the above table

No extended negotiations as SCU is accepted by EP Navigator system.

4.2.1.3.2.3. SOP Specific Conformance for Patient Root Query/Retrieve Information Model - MOVE SOP Class

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
The behavior of an Application Entity SOP class is summarized as shown in next Table. The standard as well as the manufacturer specific status codes and their corresponding behavior is specified.

4.2.1.3.2.3.1. Dataset Specific Conformance for Patient Root Q/R Information Model - MOVE SOP Class SCU

This section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

Table 21: Identifiers for MOVE SCU

Attribute Name	Tag	VR	Comment
Patient Root Information Model			
Query/Retrieve Level	0008,0052	CS	
Q/R Patient level			
Patient ID	0010,0020	LO	
Q/R Study level (Patient Root)			
Patient ID	0010,0020	LO	
Study Instance UID	0020,000D	UI	

Table 22: C-MOVE-RQ Status Response

Service Status	Code	Further Meaning	Description
Success	0000	Sub-operations complete-No Failures	The move job is marked as completed. The association is released.
Refused	A701	Out of Resources-Unable to calculate number of matches	The move job is marked as failed. The association is released. The reason is logged.

Service Status	Code	Further Meaning	Description
	A702	Out of Resources – Unable to perform sub-operations	The move job is marked as failed. The association is released. The reason is logged.
	A801	Move Destination unknown	The move job is marked as failed. The association is released. The reason is logged.
Failed	A900	Identifier does not match SOP class	The move job is marked as failed. The association is released. The reason is logged.
	Cxxx	Unable to process	The move job is marked as failed. The association is released. The reason is logged.
Cancel	FE00	Sub-operations terminated due to Cancel Indication	The move job is marked as failed. The association is released. The reason is logged.
Warning	B000	Sub-operations complete – One or more Failures	The move job is marked as completed. The association is released.
Pending	FF00	Sub-operations are continuing.	The move job continues.

Table 23: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The move job fails in case of association setup. The reason is logged.
Reply Time-out	The move job fails and the association is aborted. The reason is logged.
Association Time-out SCU	N/A
Association aborted	The move job fails. The reason is logged and.

4.2.1.3.2.4. SOP Specific Conformance for Study Root Query/Retrieve Information Model - MOVE SOP Class

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
The behavior of an Application Entity SOP class is summarized as shown in next Table. The standard as well as the manufacturer specific status codes and their corresponding behavior is specified.

4.2.1.3.2.4.1. Dataset Specific Conformance for Study Root Query/Retrieve Information Model - MOVE SOP Class SCU

This section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

Table 24: Identifiers for MOVE SCU

Attribute Name	Tag	VR	Comment
Study Root Information Model			
Query/Retrieve Level	0008,0052	CS	
Q/R Study level (Study Root)			
Study Instance UID	0020,000D	UI	

Table 25: C-MOVE-RQ Status Response

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

Table 26: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The move job fails in case of association setup. The reason is logged
Reply Time-out	The move job fails and the association is aborted. The reason is logged
Association Time-out SCU	N/A
Association aborted	The move job fails. The reason is logged

4.2.1.3.3. (Real-World) Activity – Storage Commitment Push Model AS SCU

4.2.1.3.3.1. Description and Sequencing of Activities
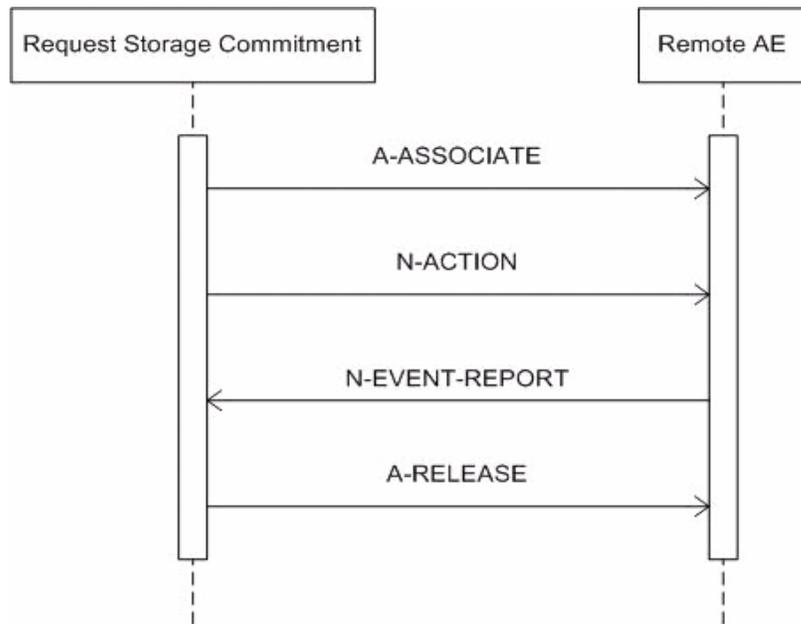
Figure 6: (Real World) Activity – Storage Commitment PUSH as SCU
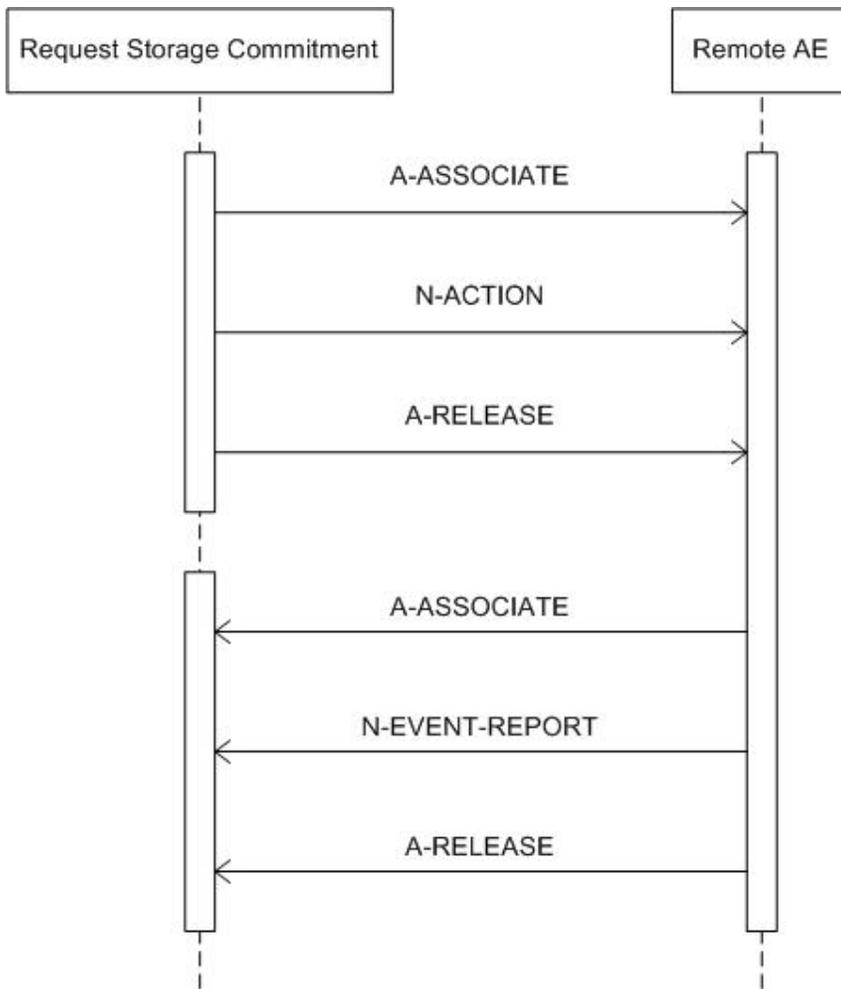
Figure 7: Sequencing of Asynchronous RWA Request Storage Commitment

The RWA Request Storage Commitment involves the storage commitment of images on a remote system.

If configured, Storage Commitment will be initiated in a new association after closing the association of the related image storage (C-STORE). This new association will be open until the remote archive sends a storage commitment report (synchronous) or when the configured maximum time is passed. When this maximum configured period is passed, it is the responsibility of the remote archive to setup a new association with EP Navigator system and send the storage commitment report (asynchronous)

4.2.1.3.3.2. Proposed Presentation Contexts

Table 27: Proposed Presentation Contexts for (Real-World) Activity – Storage Commitment Push Model AS SCU

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	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

EP Navigator system is capable of proposing the Presentation Contexts shown in the above table

No extended negotiations as SCU are accepted by EP Navigator system.

4.2.1.3.3.3. SOP Specific Conformance for Storage Commitment Push Model SOP Class

The ACP3EPW provides standard conformance. In EP Navigator system, single remote node can be configured for storing Images. One node can be configured to deliver the Storage Commitment service.

4.2.1.3.3.3.1. Dataset Specific Conformance for Storage Commitment Push Model N-ACTION SCU

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

Table 28: Storage Commitment Attribute for N-ACTION-RQ

Attribute Name	Tag	Comment
Storage Commitment Module		
Transaction UID	0008,1195	

Table 29: N-ACTION-RQ Status Response

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

Table 30: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The reason is logged.
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.

4.2.1.3.3.3.2. Dataset Specific Conformance for Storage Commitment Push Model N-EVENT-REPORT SCP

This section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

Table 31: Storage Commitment Attribute for N-EVENT-REPORT-RQ

Attribute Name	Tag	Comment
Storage Commitment Module		
Transaction UID	0008,1195	
Referenced SOP Sequence	0008,1199	
>Referenced SOP Class UID	0008,1150	
>Referenced SOP Instance UID	0008,1155	
Failed SOP Sequence	0008,1198	
>Failure Reason	0008,1197	

Table 32: N-EVENT-REPORT-RQ Status Response

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

Table 33: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The reason is logged.
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.

4.2.1.3.3.3.3. Dataset Specific Conformance for Storage Commitment Push Model N-EVENT-REPORT SCU

This section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

Table 34: Storage Commitment Attribute for N-EVENT-REPORT-RSP

Attribute Name	Tag	Comment

Table 35: N-EVENT-REPORT-RSP Status Response

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

Table 36: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The reason is logged.

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.

4.2.1.3.4. (Real-World) Activity – Image Export

4.2.1.3.4.1. Description and Sequencing of Activities
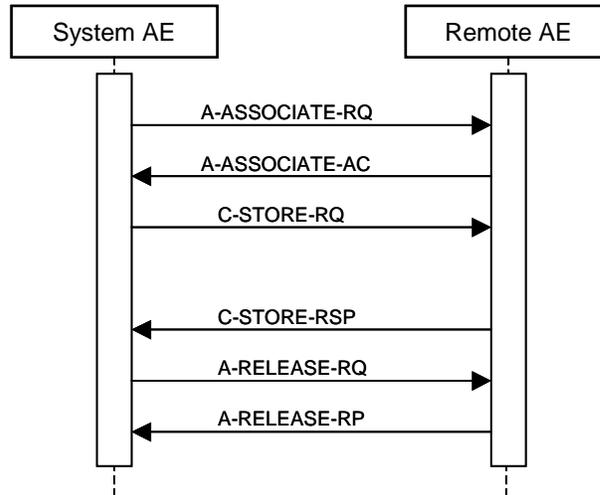
Figure 8: (Real World) Activity - Image Export

The local Real World Activity, "Snapshot" and "Snapshot All" captures the active screen display image/s and through ACP3EPW exports these images to a Remote AE.

The EP Navigator system initiates an association request with the Remote AE. After getting the Association Acceptance from the Remote AE, sends the images one after the other with the C_STORE_RQ and C_ STORE _RSP.

ACP3EPW then requests the Association release with A_ RELEASE _RQ. The association will be successfully released after ACP3EPW receives A_RELEASE_RSP from the Remote AE.

4.2.1.3.4.2. Proposed Presentation Contexts

Table 37: Proposed Presentation Contexts for (Real-World) Activity – Image Export

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

EP Navigator system is capable of proposing the Presentation Contexts shown in the above table

No extended negotiations as SCU is accepted by EP Navigator system

4.2.1.3.4.3. SOP Specific Conformance for Storage SOP Classes

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
The behavior of an Application Entity SOP class is summarized as shown in next Table. The standard as well as the manufacturer specific status codes and their corresponding behavior is specified.

Table 38: C-STORE-RQ Status Response

Service Status	Code	Further Meaning	Description
Success	0000	Storage is complete	Continues with next store until completed thereafter the store job is marked as completed and the association is released.
Refused	A7xx	Out of Resources	The store job fails and the association is released. The reason is logged
Error	A9xx	Data set does not match SOP class	The store job fails and the association is released. The reason is logged
	Cxxx	Cannot understand	The store job fails and the association is released. The reason is logged
Warning	B000	Coercion of Data Elements	Continues with next store until completed thereafter the store job is marked as completed and the association is released.
	B006	Elements discarded	Continues with next store until completed thereafter 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 thereafter the store job is marked as completed and the association is released.

Table 39: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The store job fails in case of association setup. The reason is logged.
Reply Time-out	The store job fails and association is aborted The reason is logged
Association Time-out SCU	The association is released.
Association aborted	The store job fails. The reason is logged.

4.2.1.4. Association Acceptance Policy

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

The behavior of the AE during association rejection is summarized in next table

Table 40: 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. Error is logged.
		2 – application-context-name-not-supported	Association is not established. Error is logged.
		3 – calling-AE-title-not-recognized	Association is not established. Error is logged.
		7 – called-AE-title-not-recognized	Association is not established. Error is logged.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established. Error is logged.
		2 – protocol-version-not-supported	Association is not established. Error is logged.
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Association is not established. Error is logged.
		2 – local-limit-exceeded	Association is not established. Error is logged.
2 – rejected-transient	1 – DICOM UL service-user	1 – no-reason-given	Association is not established. Error is logged.
		2 – application-context-name-not-supported	Association is not established. Error is logged.
		3 – calling-AE-title-not-recognized	Association is not established. Error is logged.
		7 – called-AE-title-not-recognized	Association is not established. Error is logged.
	2 – DICOM UL service-provider (ACSE related function)	1 – no-reason-given	Association is not established. Error is logged.
		2 – protocol-version-not-supported	Association is not established. Error is logged.
	3 – DICOM UL service-provider (presentation related function)	1 – temporary-congestion	Association is not established. Error is logged.
		2 – local-limit-exceeded	Association is not established. Error is logged.

The behavior of the AE on receiving an association abort is summarized in next table

Table 41: DICOM Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	Application terminates the connection. Error is logged
2 – DICOM UL service-provider	0 – reason-not-specified	Application terminates the connection. Error is logged
	1 – unrecognized-PDU	Application terminates the connection. Error is logged
	2 – unexpected-PDU	Application terminates the connection. Error is logged
	4 – unrecognized-PDU parameter	Application terminates the connection. Error is logged
	5 – unexpected-PDU parameter	Application terminates the connection. Error is logged
	6 – invalid-PDU-parameter value	Application terminates the connection. Error is logged

The behavior of the AE for sending an association abort is summarized in next table.

Table 42: DICOM Association Abort Policies

Source	Reason/Diagnosis	Behavior
0 – DICOM UL service-user	0 – reason-not-specified	Application terminates the connection. Error is logged
2 – DICOM UL service-provider	0 – reason-not-specified	Application terminates the connection. Error is logged
	1 – unrecognized-PDU	Application terminates the connection. Error is logged
	2 – unexpected-PDU	Application terminates the connection. Error is logged
	4 – unrecognized-PDU parameter	Application terminates the connection. Error is logged
	5 – unexpected-PDU parameter	Application terminates the connection. Error is logged
	6 – invalid-PDU- parameter value	Application terminates the connection. Error is logged

4.2.1.4.1. (Real-World) Activity – Verification as SCP

4.2.1.4.1.1. Description and Sequencing of Activities
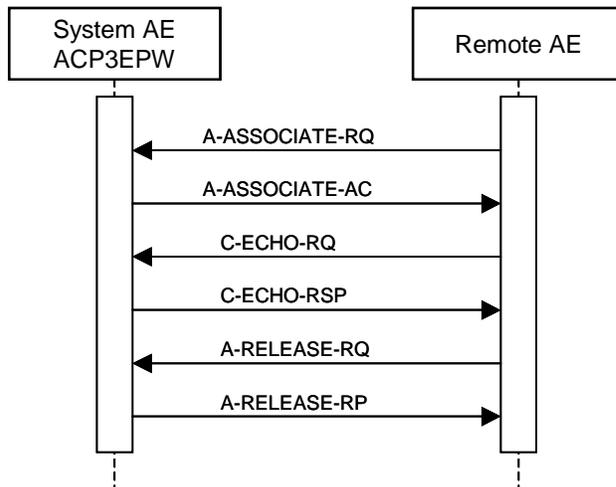
Figure 9: (Real World) Activity - Verification as SCP

The ACP3EPW accepts associations from Remote AEs that wish to verify application level communication using the C-ECHO command.

4.2.1.4.1.2. Accepted Presentation Contexts

Table 43: Acceptable Presentation Contexts for (Real-World) Activity – Verification as SCP

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	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

The ACP3EPW can accept the presentation contexts specified in the above table. Extended negotiations are not supported by EP Navigator system.

4.2.1.4.1.3. SOP Specific Conformance for Verification SOP Class

The ACP3EPW provides standard conformance to the Verification service class.

4.2.1.4.1.3.1. Dataset Specific Conformance for Verification C-ECHO SCP

This section includes the dataset specific behavior, i.e. error codes, error and exception handling, time-outs, etc.

Table 44: C-ECHO-RSP Status Response

Service Status	Code	Further Meaning	Description
Success	0000	Confirmation	Confirm the verification request

Table 45: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The verification request fails. The reason is logged.
Reply Time-out	The verification request fails and association is aborted The reason is logged
Association Time-out SCU	The association is released.
Association aborted	The verification request fails. The reason is logged.

4.2.1.4.2. (Real-World) Activity – Image Import

4.2.1.4.2.1. Description and Sequencing of Activities
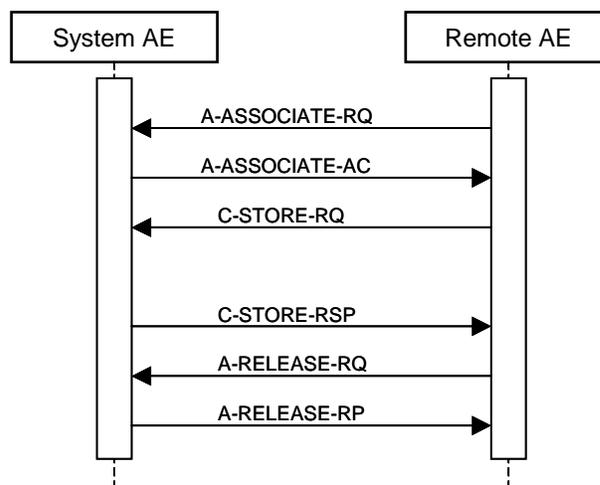
**Figure 10: (Real World) Activity - Image Import**

The Remote AE initiates an association request with A_ASSOCIATE_RQ to EP Navigator Application Entity, ACP3EPW for sending the patient study information or image data sets to EP Navigator.
ACP3EPW accepts the association request by sending the response A_ASSOCIATE_AC to Remote AE.

Remote AE then sends the patient study information or image data sets with C_STORE_RQ for which the ACP3EPW responds for each image with C_STORTE_RSP.

Association gets closed with the A_RELEASE_RQ from the Remote AE and A_RELEASE_RP back from ACP3EPW.

4.2.1.4.2.2. Accepted Presentation Contexts

Table 46: Acceptable Presentation Contexts for (Real-World) Activity – Image Import

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
12-Lead ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Ambulatory ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Hemodynamic Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.2.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Multi-frame Grayscale Byte SC Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Multi-frame Grayscale Word SC Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Multi-frame Single Bit Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

The ACP3EPW Application Entity is capable of accepting the above mentioned Presentation Contexts from the Remote AE.

No Extended Negotiation as an ACP is accepted by the EP Navigator system.

4.2.1.4.2.3. SOP Specific Conformance for Storage SOP Classes

This section includes the SOP specific behavior, i.e. error codes, error and exception handling, time-outs, etc.
The behavior of an Application Entity SOP class is summarized as shown in next Table . The standard as well as the manufacturer specific status codes and their corresponding behavior is specified.

Table 47: C-STORE-RSP Status Response

Service Status	Code	Further Meaning	Description
Success	0000	Storage is complete	The image(s) will be stored in the EP Navigator database
Refused	A700	Out of Resources	The EP Navigator database is full. EP Navigator shall send a notification, log the condition and abort association.
Error	A900	Data set does not match the SOP class	The SOP class of the image(s) does not match the negotiated abstract syntax. EP Navigator shall send a notification. Log the condition and abort the association.
	C000	Cannot understand	The image(s) cannot be parsed. EP Navigator shall send a notification, log the condition, and abort the association.

Service Status	Code	Further Meaning	Description
Warning	B000	Coercion of Data Elements	NA
	B006	Elements discarded	NA
	B007	Data set does not match SOP class	NA

Table 48: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The store job fails in case of association setup. The reason is logged.
Reply Time-out	The store job fails and association is aborted The reason is logged
Association Time-out SCU	The association is released.
Association aborted	The store job fails. The reason is logged.

4.3. Network Interfaces

4.3.1. Physical Network Interfaces

The EP Navigator system provides DICOM V3.0 TCP/IP Network Communication Support as defined by the part 8 of the DICOM Standard. EP Navigator system uses DICOM V3.0 TCP/IP Network Communication installed on the Platform where ACP3EPW DICOM Application Entity is running on.

Supported physical media include:
IEEE 802.3-1995 (Fast Ethernet) 100Base-TX
IEEE 802.3-1995 10Base-TX
IEEE 802.3 1000BASE-X (Fiber Optic Gigabit Ethernet)

4.3.2. Additional Protocols

Not applicable.

4.4. Configuration

Any implementation's DICOM conformance may be dependent upon configuration, which takes place at the time of installation. Issues concerning configuration is addressed in this section.

4.4.1. AE Title/Presentation Address Mapping

An important installation issue is the translation from AE title to presentation address. How this is to be performed shall be described in this section.

Note: There does not necessarily have to be a one to one relationship between AE titles and Application Entities. If so, this should be made clear in the tables.

4.4.1.1. Local AE Titles

The local AE title mapping and configuration are specified.

Table 49: AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
ACP3EPW	ACP3EPW	3028

4.4.1.2. Remote AE Title/Presentation Address Mapping

The AE Title, Port Number and IP address of the Remote Applications can be configurable by the EP Navigator system.

4.4.2. Parameters

The specification of important operational parameters, their default value and range (if configurable) is specified here.

Table 50: 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	60 seconds
General DIMSE level time-out values	Yes	300 seconds

Parameter	Configurable	Default Value
Time-out waiting for response to TCP/IP connect request. (Low-level timeout)	No	Based on OS
Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)	No	Based on OS
Time-out for waiting for data between TCP/IP packets. (Low-level timeout)	No	Based on OS
Any changes to default TCP/IP settings, such as configurable stack parameters.	No	Based on OS
<Other configurable parameters>	No	
AE Specific Parameters		
Size constraint in maximum object size (see note 1)	No	
Maximum PDU size the AE can receive	No	Unlimited
Maximum PDU size the AE can send	No	Unlimited
AE specific DIMSE level time-out values	Yes	300 seconds
Number of simultaneous Associations by Service and/or SOP Class	No	1
<SOP Class support (e.g. Multi-frame vs single frame vs SC support), when configurable>	Yes	60 seconds
<Transfer Syntax support, e.g. JPEG, Explicit VR, when configurable>	Yes	
<Other configurable parameters>	Yes	ILE ELE EBE

5. MEDIA INTERCHANGE

Not Applicable.

6. SUPPORT OF CHARACTER SETS

Any support for character sets beyond the default character repertoire in Network and Media services shall be described here.

Table 51: Supported DICOM Character Sets of Electro Physiology Navigator - EP Navigator

Character Set Description	Defined Term	ESC Sequence	ISO Registration Number	Code Element	Character Set
Latin alphabet No. 1	ISO_IR 100	-	ISO-IR 6	G0	ISO 646
		-	ISO-IR 100	G1	Supplementary set of ISO 8859

7. SECURITY

Not Applicable.

8. ANNEXES OF APPLICATION "ACP3EPW (APPLICATION)"

8.1. IOD Contents

8.1.1. Created SOP Instance

This section specifies each IOD created (including private IOD's). It should specify the attribute name, tag, VR, and value. The value should specify the range and source (e.g. user input, Modality Worklist, automatically generated, etc.). For content items in templates, the range and source of the concept name and concept values should be specified. Whether the value is always present or not shall be specified.

Abbreviations used in the IOD tables for the column "Presence of Module" are:

ALWAYS	The module is always present
CONDITIONAL	The module is used under specified condition

Abbreviations used in the Module table for the column "Presence of Value" are:

ALWAYS	The attribute is always present with a value
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 (attribute sent zero length if no value is present)
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 (attribute sent zero length if condition applies and no value is present)
ANAPEV	The attribute is present under specified condition – if present then it will not have any value

The abbreviations used in the Module table for the column "Source" are:

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 is the same as that use for Modality Performed Procedure Step
MWL	The attribute value source is a Modality Worklist
USER	The attribute value source is explicit user input

8.1.1.1. List of created SOP Classes

Table 52: 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

8.1.1.2. Secondary Capture Image Storage SOP Class

Table 53: IOD of Created Secondary Capture Image Storage SOP Class 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
Equipment	SC Equipment Module	ALWAYS
Image	General Image Module	ALWAYS
Image	Image Pixel Module	ALWAYS
Image	SOP Common Module	ALWAYS
	Additional Module	ALWAYS

Table 54: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Name	0010,0010	PN		VNAP	AUTO	Provided by Allura (active patient)
Patient ID	0010,0020	LO		ALWAYS	AUTO	Provided by Allura (active patient)
Patient's Birth Date	0010,0030	DA		VNAP	AUTO	Provided by Allura (active patient)
Patient's Sex	0010,0040	CS		VNAP	AUTO	Provided by Allura (active patient)

Table 55: General Study Module

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

Table 56: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	UID generated by EP Navigator
Series Number	0020,0011	IS		VNAP	AUTO	Generated by EP Navigator, increases for every new snapshot series created.
Patient Position	0018,5100	CS		ANAPEV	AUTO	Present, but empty

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Protocol Name	0018,1030	LO	EP Snapshot	ANAP	FIXED	
Performed Procedure Step Start Date	0040,0244	DA		ANAP	AUTO	Provided by Allura (active study)
Performed Procedure Step Start Time	0040,0245	TM		ANAP	AUTO	Provided by Allura (active study)

Table 57: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips Medical Systems	VNAP	FIXED	
Institution Name	0008,0080	LO		ANAP	AUTO	provided by Allura (active study)
Software Version(s)	0018,1020	LO	PMS5.2 MIT PIIMDictionary	ANAP	FIXED	

Table 58: SC Equipment Module

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

Table 59: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Instance Number	0020,0013	IS		VNAP	AUTO	Generated by EP Navigator. Starts with 1 and is incremented for each image ib the SC series exported.
Content Date	0008,0023	DA		ANAPEV	AUTO	Generated by EP Navigator, current date
Content Time	0008,0033	TM		ANAPEV	AUTO	Generated by EP Navigator, current time
Patient Orientation	0020,0020	CS		ANAPEV	AUTO	Present, but empty
Image Type	0008,0008	CS	DERIVED, SECONDARY, EP Navigator	ANAP	CONFIG	

Table 60: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Samples per Pixel	0028,0002	US	3	ALWAYS	FIXED	
Photometric Interpretation	0028,0004	CS	RGB	ALWAYS	FIXED	
Rows	0028,0010	US		ALWAYS	AUTO	Based on the screen resolution of the input that was captured. Supported values are: (768, 1024, 1200)
Columns	0028,0011	US		ALWAYS	AUTO	Based on the screen resolution of the input that was captured. Supported values are: (1024, 1280, 1600)
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	0000	ALWAYS	FIXED	
Pixel Data	7FE0,0010	OW/OB		ALWAYS	AUTO	pixel data
Planar Configuration	0028,0006	US	000	ANAP	FIXED	

Table 61: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.7	ANAP	AUTO	
SOP Instance UID	0008,0018	UI		ANAP	AUTO	Unique UID generated by EP Navigator

Table 62: Additional Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Private Creator Group 2001	2001,0010	LO	Philips Imaging DD 001	ANAP	FIXED	
Examination Source	2001,1063	CS	ELSEWHERE	ANAP	FIXED	

8.1.2. Usage of Attributes from Received IOD

Table 63: Functionalities

Functionality	Type1	Optional	Private
3D Reconstruction	X		

8.1.2.1. Usage of the Functionality 3D Reconstruction

Table 64: Supported SOP Classes for functionality 3D Reconstruction

SOP Class name	SOP Class UID
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2

Table 65: Supported Optional attributes of functionality 3D Reconstruction

8.1.3. Attribute Mapping

When attributes are used by different SOP Classes (e.g. Modality Worklist, Storage and Modality Performed Procedure Step) this mapping shall be specified. For devices that specify other external protocols (such as HL7) mapping of their fields into the DICOM attributes is not required but highly recommended.

8.1.4. Coerced/Modified fields

An SCU might coerce certain attributes, e.g. the Patient's Name. An SCP might provide a different value of an attribute than was received. These changes shall be specified here. An example is Patient's Name, which could be modified using available information from either an internal database or obtained from an Information System/Information Manager. Another example is the generation of a new SOP Instance UID for an existing instance. The conditions influencing such coercion should be specified

8.2. Data Dictionary of Private Attributes

Not Applicable.

8.3. Coded Terminology and Templates

Not Applicable.

8.4. Grayscale Image consistency

Not Applicable.

8.5.   Standard Extended/Specialized/Private SOPs

Not Applicable.

8.6.   Private Transfer Syntaxes

Not Applicable.