

DICOM Conformance Statement

DynaSuite Cardiac



Issued by:

Philips Medical Systems Nederland BV, a Philips Healthcare company,

P.O. Box 10.000
5680 DA Best
The Netherlands

Email: dicom@philips.com
Internet: <http://www.healthcare.philips.com/connectivity>

Document Number: 6535364
Date: 02-July-2010

1. DICOM Conformance Statement Overview

The DynaSuite Cardiac system exists of Cardiac Workstation and Explorer Platform. The Cardiac Workstation supports the Cardiac Explorer application and viewing of the original and created images. The Platform Explorer performs the functions required for import, export, storage, archiving and worklist management of medical data and images.

The Cardiac Explorer clinical application which has the intended use in processing cardiac or cardiovascular MR images, resulting in quantitative and/or qualitative data that can be used to estimate cardiac or cardiovascular function, to assist with diagnosis.

The DynaSuite Cardiac system can be used by trained professionals, including but not limited to physicians, radiologists, nurses, medical technicians and assistants.

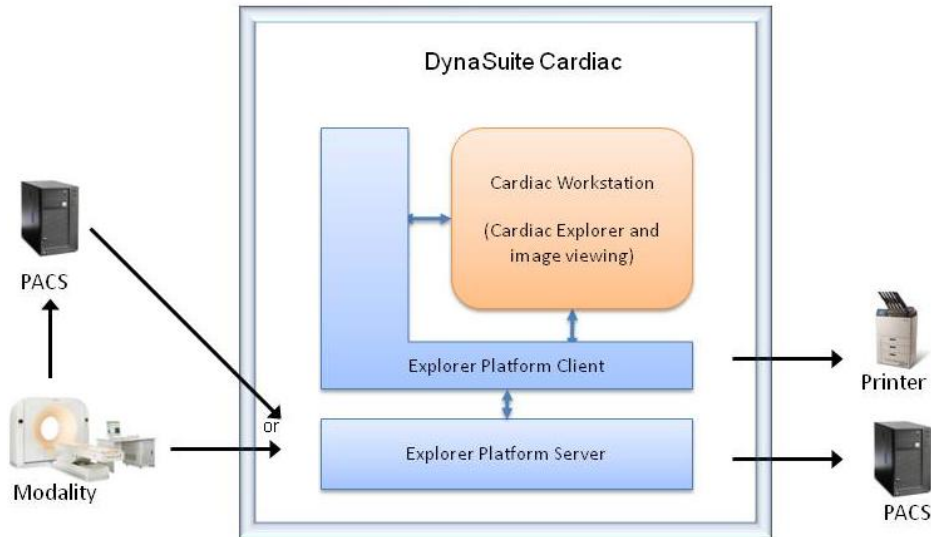


Figure 1: DynaSuite in a DICOM network

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
Print Management			
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Yes	No
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	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
Query/Retrieve			
Patient Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes
Patient Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes
Study Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Yes	Yes
Study Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes
PatientStudy Only QR Info. Model - FIND SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.1	Yes	Yes
PatientStudy Only QR Info. Model - MOVE SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.2	Yes	Yes

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	UID		
Transfer			
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1	Yes	Yes

Note: Image of the Storage SOP Classes which are successfully receives can be sent out by the DynaSuite Cardiac.

Media Storage Application Profiles (with roles) are not provided.

2. Table of Contents

1.	DICOM CONFORMANCE STATEMENT OVERVIEW	3
2.	TABLE OF CONTENTS	5
3.	INTRODUCTION	8
3.1.	REVISION HISTORY	8
3.2.	AUDIENCE.....	8
3.3.	REMARKS	8
3.4.	DEFINITIONS, TERMS AND ABBREVIATIONS	9
3.5.	REFERENCES.....	9
4.	NETWORKING	10
4.1.	IMPLEMENTATION MODEL	10
4.1.1.	Application Data Flow.....	10
4.1.2.	Functional Definition of AE's	11
4.1.2.1.	Functional Definition of Explorer Platform Client AE	11
4.1.2.2.	Functional Definition of Explorer Platform Server AE	11
4.1.3.	Sequencing of Real World Activities.....	11
4.2.	AE SPECIFICATIONS	13
4.2.1.	Explorer Platform Client AE.....	13
4.2.1.1.	SOP Classes	13
4.2.1.2.	Association Policies	13
4.2.1.2.1.	General.....	13
4.2.1.2.2.	Number of Associations	13
4.2.1.2.3.	Asynchronous Nature	14
4.2.1.2.4.	Implementation Identifying Information	14
4.2.1.2.5.	Communication Failure Handling	14
4.2.1.3.	Association Initiation Policy.....	14
4.2.1.3.1.	(Real-World) Activity – Verification as SCU	15
4.2.1.3.2.	(Real-World) Activity – Print Management as SCU.....	16
4.2.1.4.	Association Acceptance Policy	24
4.2.2.	Explorer Platform Server AE	25
4.2.2.1.	SOP Classes	25
4.2.2.2.	Association Policies	25
4.2.2.2.1.	General.....	25
4.2.2.2.2.	Number of Associations	25
4.2.2.2.3.	Asynchronous Nature	26
4.2.2.2.4.	Implementation Identifying Information	26
4.2.2.2.5.	Communication Failure Handling	26
4.2.2.3.	Association Initiation Policy.....	26
4.2.2.3.1.	(Real-World) Activity – FIND as SCU	27
4.2.2.3.2.	(Real-World) Activity – MOVE as SCU	31
4.2.2.3.3.	(Real-World) Activity – Image Export.....	35
4.2.2.4.	Association Acceptance Policy	38
4.2.2.4.1.	(Real-World) Activity – Verification as SCP	38
4.2.2.4.2.	(Real-World) Activity – FIND as SCP.....	40
4.2.2.4.3.	(Real-World) Activity – MOVE as SCP	46
4.2.2.4.4.	(Real-World) Activity – Image Import	49
4.3.	NETWORK INTERFACES.....	53
4.3.1.	Physical Network Interfaces	53
4.3.2.	Additional Protocols.....	53
4.4.	CONFIGURATION	53
4.4.1.	AE Title/Presentation Address Mapping.....	53
4.4.1.1.	Local AE Titles.....	53
4.4.1.2.	Remote AE Title/Presentation Address Mapping.....	53

4.4.2.	Parameters.....	53
5.	MEDIA INTERCHANGE	55
5.1.	IMPLEMENTATION MODEL	55
5.1.1.	Application Data Flow Diagram	55
5.1.2.	Functional Definitions of AE's.....	55
5.1.3.	Sequencing of Real World Activities.....	55
5.2.	AE SPECIFICATIONS	55
5.3.	AUGMENTED AND PRIVATE APPLICATION PROFILES	55
5.4.	MEDIA CONFIGURATION.....	55
6.	SUPPORT OF CHARACTER SETS.....	56
7.	SECURITY.....	57
7.1.	SECURITY PROFILES	57
7.1.1.	Security use Profiles.....	57
7.1.2.	Security Transport Connection Profiles	57
7.1.3.	Digital Signature Profiles	57
7.1.4.	Media Storage Security Profiles	57
7.1.5.	Attribute Confidentiality Profiles.....	57
7.1.6.	Network Address Management Profiles	57
7.1.7.	Time Synchronization Profiles	57
7.1.8.	Application Configuration Management Profiles.....	57
7.1.9.	Audit Trail Profiles	57
7.2.	ASSOCIATION LEVEL SECURITY	57
7.3.	APPLICATION LEVEL SECURITY	57
8.	ANNEXES OF APPLICATION "CARDIAC EXPLORER"	58
8.1.	IOD CONTENTS	58
8.1.1.	Created SOP Instance	58
8.1.1.1.	List of created SOP Classes	58
8.1.1.2.	Secondary Capture Image Storage SOP Class	59
8.1.2.	Usage of Attributes from Received IOD	61
8.1.2.1.	Usage of the Functionality Cardiac Explorer viewer.....	61
8.1.3.	Attribute Mapping	61
8.1.4.	Coerced/Modified fields.....	61
8.2.	DATA DICTIONARY OF PRIVATE ATTRIBUTES	62
8.3.	CODED TERMINOLOGY AND TEMPLATES	62
8.3.1.	Context Groups	62
8.3.2.	Template Specifications	62
8.3.3.	Private code definitions	62
8.4.	GRAYSCALE IMAGE CONSISTENCY	62
8.5.	STANDARD EXTENDED/SPECIALIZED/PRIVATE SOPS	63
8.5.1.	Standard Extended/Specialized/Private SOP Instance	63
8.5.1.1.	Secondary Capture Image Storage SOP Class	63
8.6.	PRIVATE TRANSFER SYNTAXES	63
9.	ANNEXES OF APPLICATION "IMAGE VIEWING"	64
9.1.	IOD CONTENTS	64
9.1.1.	Created SOP Instance	64
9.1.1.1.	List of created SOP Classes	64
9.1.1.2.	Secondary Capture Image Storage SOP Class	65
9.1.2.	Usage of Attributes from Received IOD	68
9.1.2.1.	Usage of the Functionality image viewing.....	68
9.1.3.	Attribute Mapping	68
9.1.4.	Coerced/Modified fields.....	68
9.2.	DATA DICTIONARY OF PRIVATE ATTRIBUTES	69
9.3.	CODED TERMINOLOGY AND TEMPLATES	69
9.3.1.	Context Groups	69
9.3.2.	Template Specifications	69

- 9.3.3. Private code definitions 69
- 9.4. GRAYSCALE IMAGE CONSISTENCY 69**
- 9.5. STANDARD EXTENDED/SPECIALIZED/PRIVATE SOPS 69**
- 9.5.1. Standard Extended/Specialized/Private SOP Instance 69
- 9.5.1.1. Secondary Capture Image Storage SOP Class 69
- 9.6. PRIVATE TRANSFER SYNTAXES 70**

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	Status	Description
00	28-May-2010	Proposal	Initial version
01	18-June-2010	Proposal	Updated version after review comments
02	24-June-2010	Approved	Final version
03	02-July-2010	Approved	Final version after update of review comments

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).

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

Table 3: Definitions, Terms and Abbreviations

Abbreviation/Term	Explanation
AE	Application Entity
CD	Compact Disc
DICOM	Digital Imaging and Communications in Medicine
EBE	DICOM Explicit VR Big Endian
ELE	DICOM Explicit VR Little Endian
FSC	File-set Creator
FSR	File-set Reader
FSU	File-set Updater
ILE	DICOM Implicit VR Little Endian
IOD	Information Object Definition
MR	Magnetic Resonance
NEMA	National Electrical Manufacturers Association
OT	Other
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
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

3.5. References

[DICOM] Digital Imaging and Communications in Medicine, Parts 1 - 18 (NEMA PS 3.1- PS 3.18),
National Electrical Manufacturers Association (NEMA)
Publication Sales 1300 N. 17th Street, Suite 1752
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 2009) 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 Explorer Platform Server application entity and Explorer Platform Client application entities are all integrated parts of the DynaSuite Cardiac product.

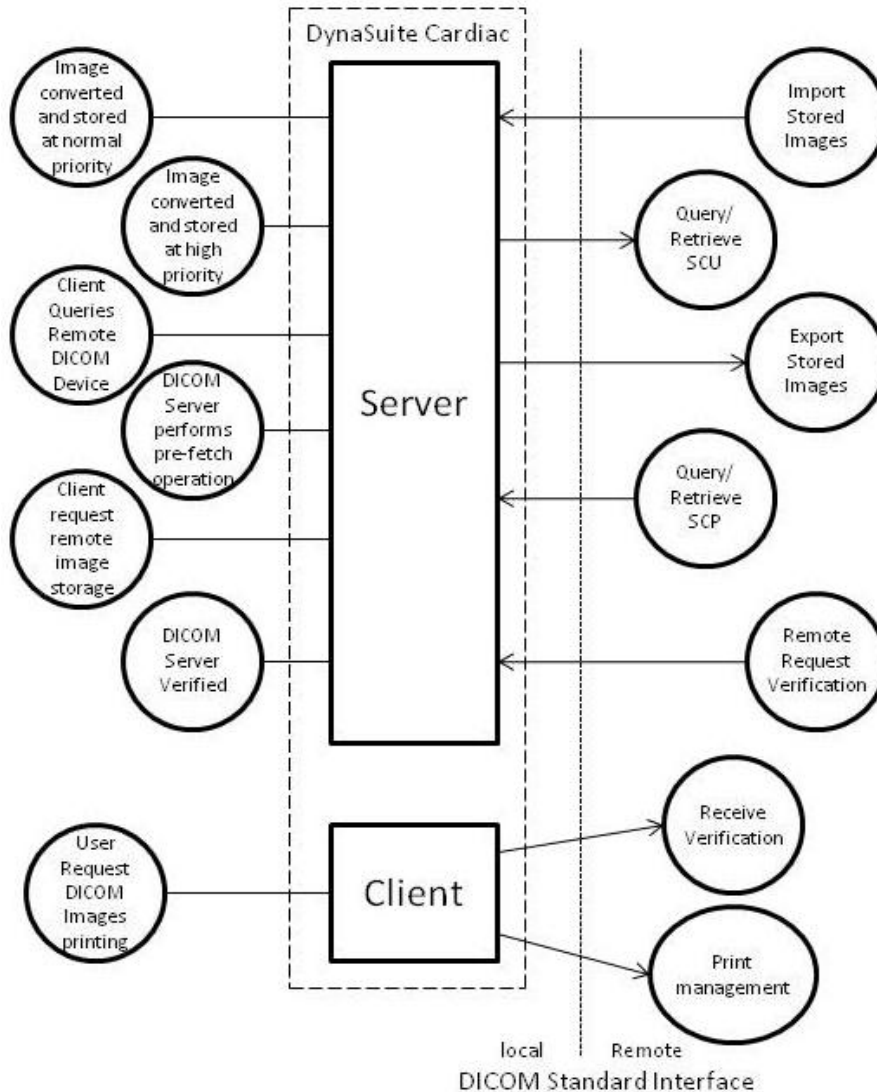


Figure 2: Application Data Flow Diagram

4.1.2. Functional Definition of AE's

This section contains a functional definition for each individual local Application Entity.

4.1.2.1. Functional Definition of Explorer Platform Client AE

The Client will initiate DICOM associations for DICOM Printing services on an as needed basis dependent upon interactive requests from users of the system.

4.1.2.2. Functional Definition of Explorer Platform Server AE

The Server can initiate and receive DICOM association requests. It runs as a Windows 2003 Server service and will automatically be started as part of the operating system. Once started, the DICOM server will wait for another application to connect to its DICOM Storage service. Client applications also have the ability to initiate DICOM associations by the Server to remote DICOM devices for Storage and Query/Retrieve services.

4.1.3. Sequencing of Real World Activities

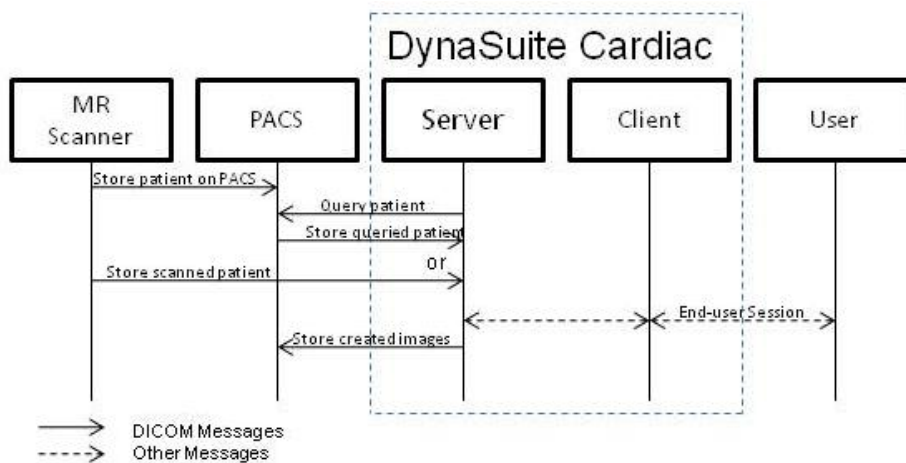


Figure 3: Sequencing of Real World Activities

The Sequence start when the scanner is ready, it sends the acquired data to the PACS (if scanner is configured to do so) and to the DynaSuite Cardiac server. The order does not matter. Or the images are earlier scanned and send to the PACS and now queried from the PACS.

The user activates the Client and browses patients to find the patient.

When the patient has found, the user selects it from the worklist and opens the exam. The client responds by launching on the canvas on the one screen and the Cardiac Explorer and image viewing on the other.

Cardiac Explorer requests the exam from the Server. The server responds by sending the requested data to the client.

The user performs a Cardiac Explorer analysis. During a Cardiac Explorer session, the user may make reports. The system saves them on the server and the user can see them as thumbnails on the canvas.

The image viewing is available for viewing the original and created images.

The user can do measurement and place annotations on the images and make captures of this new created data. The system can stores the results as Secondary Capture image of the image viewing on the server and the user can see them as thumbnails on the canvas.

By taps the user can switch between Cardiac Explorer to image viewing or closes the canvas.

When the user close the canvas the system stores the results from the Cardiac Explorer and image viewing on the server, including private objects.

The server can auto pushes these results to the configure PACS for storing the received data.

Optionally, the user may want to print the results make by the Cardiac Explorer or image viewing sessions. These results are available on the Canvas. The user selects the items he wants to print and indicates to the client that they should be printed.

4.2. AE Specifications

This 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. Explorer Platform Client AE

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 4: SOP Classes for Explorer Platform Client AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	No
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Yes	No
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Yes	No
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	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

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 is specified below.

Table 5: DICOM Application Context

Description	Value
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 here.

Table 6: Number of associations as an Association Initiator for this AE

Description	Value
Maximum number of simultaneous associations	1

Table 7: Number of associations as an Association Acceptor for this AE

Description	Value
Maximum number of simultaneous associations	0

4.2.1.2.3. Asynchronous Nature

Not supported.

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 Explorer Platform Client AE

Implementation Class UID	1.3.46.670589.46.2.2.1
Implementation Version Name	Philips_EPL_21

4.2.1.2.5. Communication Failure Handling

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

Table 9: Communication Failure Behavior

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

4.2.1.3. Association Initiation Policy

The Application Entity will respond to a received Association rejection as shown in the next table.

Table 10: Association Rejection response

Result	Source	Reason/Diagnosis	Behavior
1 - rejected-permanent	1 - DICOM UL service-user	1 - no-reason-given	Client displayed the error message
		2 - application-context-name-not supported	Client displayed the error message
		3 - calling-AE-title-not-recognized	Association is not established. Server logs the application IP=xxx.xxx.xxx.xxx that is not authorized to access the client.
		7 - called-AE-title-not-recognized	Client displayed the error message
	2 - DICOM UL service-provider(ACSE related function)	1 - no-reason-given	
		2 - protocol-version-not-supported	
3 - DICOM UL service-provider(Presentation related function)	1 - temporary-congestion		
	2 - local-limit-exceeded		
2 - rejected-transient	1 - DICOM UL service-user	1 - no-reason-given	
		2 - application-context-name-not-supported	
		3 - calling-AE-title-not-recognized	
		7 - called-AE-title-not-recognized	
	2 - DICOM UL service-provider(ACSE related function)	1 - no-reason-given	
		2 - protocol-version-not-supported	
	3 - DICOM UL service-provider (Presentation related function)	1 - temporary-congestion	
		2 - local-limit-exceeded	

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

Table 11: Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 - DICOM UL service-user (initiated abort)	0 - reason-not-specified	Close the association and display the error reason message
2 - DICOM UL service-provider (initiated abort)	0 - reason-not-specified	
	1 - unrecognized-PDU	
	2 - unexpected-PDU	
	4 - unexpected-PDU parameter	
	5 - unexpected-PDU parameter	
	6 - invalid-PDU-parameter value	

4.2.1.3.1. (Real-World) Activity – Verification as SCU

4.2.1.3.1.1. Description and Sequencing of Activities

From the DynaSuite Cardiac it is not possible to send manual a DICOM C-ECHO RQ message.

4.2.1.3.1.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 12: Proposed Presentation Contexts for (Real-World) Activity – Verification as SCU

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

4.2.1.3.1.3. SOP Specific Conformance for Verification SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

4.2.1.3.1.3.1. Dataset Specific Conformance for Verification C-ECHO SCU

Table 13: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	The verification was successful	

4.2.1.3.2. (Real-World) Activity – Print Management as SCU

4.2.1.3.2.1. Description and Sequencing of Activities

The Client application entity will establish and manage associations with remote DICOM entities to service user requests for DICOM Image Printing. User requests for DICOM Image Printing are initiated by user interaction with the application interface. The system allows to prevent printing annotations (including image information) over the patient’s anatomy.

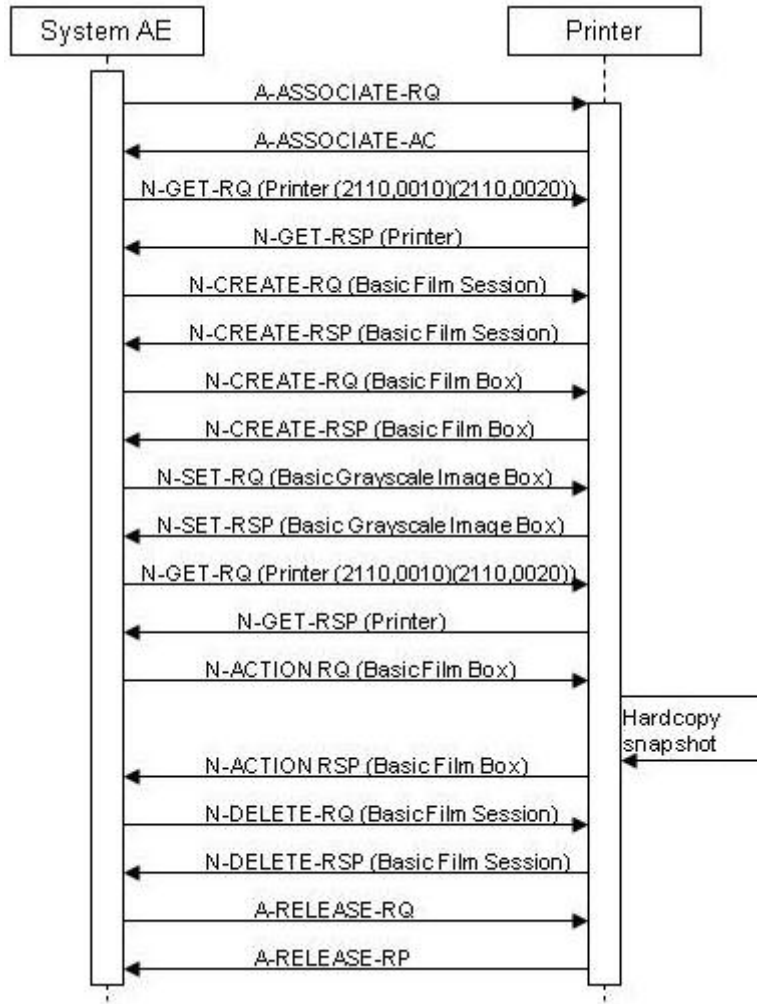


Figure 4: (Real World) Activity - Print as SCU

4.2.1.3.2.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 14: Proposed Presentation Contexts for (Real-World) Activity – Print Management as SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9			SCU	None
>Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	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		
>Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
>Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	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		
>Printer SOP Class	1.2.840.10008.5.1.1.16	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		

This section specifies each IOD created (including private IOD's).

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
VNAPCV	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

4.2.1.3.2.3. SOP Specific Conformance for Basic Film Box SOP Class of the Basic Grayscale Print Management Meta SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

4.2.1.3.2.3.1. Dataset Specific Conformance for Basic Film Box SOP Class N-CREATE-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 15: Basic Film Box Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Film Orientation	2010,0040	CS	LANDSCAPE, PORTRAIT	ALWAYS	AUTO	
Film Size ID	2010,0050	CS	10INX12IN, 10INX14IN, 11INX14IN, 11INX17IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM, 8_5INX11IN, 8INX10IN, A3, A4	ALWAYS	AUTO	
Image Display Format	2010,0010	ST	STANDARD\1,1	ALWAYS	AUTO	
Max Density	2010,0130	US		ALWAYS	AUTO	
Min Density	2010,0120	US		ALWAYS	AUTO	

Table 16: Basic Film Box Relationship Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
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	AUTO	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	AUTO	

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

Table 17: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Film Box successfully created	
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	Display the warning on the Client user interface
Failure	C616	There is an existing Film Box that has not been printed and N-ACTION at the Film Session level is not supported. A new Film Box will not be created when a previous Film Box has not been printed	Display the error on the client user interface, Printer need to clear the error before it can get new Film Box/Session to print
	0112	invalid SOP instance UID	Display the error on the user interface, Film Box can't be printed
	0110	Processing Failure	Display error on the Client user interface, Film Box can't be printed.

4.2.1.3.2.3.2. Dataset Specific Conformance for Basic Film Box SOP Class N-ACTION-SCU

An N-ACTION request is issued to instruct the Print SCP to print the contents of the Film Box. The action replay argument in an N-ACTION response is not evaluated.

The behavior of Hardcopy AE when encountering status codes in an N-ACTION response is summarized in the table below.

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

Table 18: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	The SCP has completed the operation successfully. The film has been accepted for printing.	
Failed	C602	Unable to create Print Job SOP Instance; print queue is full	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is displayed.
	C603	Film Box is empty, does not contain any image instance or image size is larger than Image Box size.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is displayed.
	C613	Combined Print Image size is larger than Image Box size	The association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is displayed.
Warning	B604	Image size is larger than Image Box size. The image has been demagnified	The N-ACTION operation is considered successful but the status meaning is displayed.
	B609	Image size is larger than Image Box size. The image has been cropped to fit.	The N-ACTION operation is considered successful but the status meaning is displayed.
	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 N-ACTION operation is considered successful but the status meaning is displayed.
Other	xxxx		The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is displayed.

4.2.1.3.2.4. SOP Specific Conformance for Basic Film Session SOP Class of the Basic Grayscale Print Management Meta SOP Class

The Basic Film Session IOD describes the presentation parameters which are common for all the films of a film session (e.g. number of films, film or destination). The Basic Film Session SOP Instance refers to one or more Basic Film Box SOP Instances

4.2.1.3.2.4.1. Dataset Specific Conformance for Basic Film Session SOP Class N-CREATE-SCU

The Client Film Session N-CREATE is used to create an instance of the Basic FILM Session SOP Class.

The following table describes the attributes being set by the N-CREATE.

Table 19: Basic Film Session Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Medium Type	2000,0030	CS	BLUE FILM, CLEAR FILM, PAPER	ALWAYS	AUTO	
Number of Copies	2000,0010	IS	1 to 10	ALWAYS	AUTO	
Print Priority	2000,0020	CS	LOW	ALWAYS	AUTO	

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

Table 20: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	The SCP has completed the operation successfully. The film has been accepted for printing.	
Warning	0116	Attribute value out of range	The N-CREATE operation is considered successful but the status meaning is logged. Additional information in the Response identifying the attributes out of range will be logged (i.e. Elements in the Modification List/Attribute List).
	0107	Attribute list error	The N-CREATE operation is considered successful but the status meaning is logged. Additional information in the Response identifying the attribute will be logged (i.e. Elements in the Attribute Identifier List)
Failed	0106	No memory allocation available	The SCP has no more memory allocation available for the new Film session.
	0213	Temporary no memory allocation available	Temporarily, the printer as no memory allocation available. Memory will free up as printer complete printing the current print jobs. The SCU will retry creating the Film Session.
	0112	Invalid SOP Instance UID	Display the error on the client user interface, Film box can't be printed
	0110	Processing Failure	Display the error on the client user interface, Film Box can't be printed.
Other	xxxx		The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.

4.2.1.3.2.4.2. Dataset Specific Conformance for Basic Film Session SOP Class N-DELETE-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

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

Table 21: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful delete of print job	
Other	<>0000		The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is displayed.

4.2.1.3.2.5. SOP Specific Conformance for Basic Grayscale Image Box SOP Class of the Basic Grayscale Print Management Meta SOP Class

The Basic Grayscale Image Box SOP Instance is created by the Print SCP (DICOM Printer) when the Basic Film Box SOP Instance is created, based on the values of the Basic Film Box Attribute Image Display Format (2010,0010)

4.2.1.3.2.5.1. Dataset Specific Conformance for Basic Grayscale Image Box SOP Class N-SET-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 22: Image Box Pixel Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Box Position	2020,0010	US		ALWAYS	AUTO	
Basic Grayscale Image Sequence	2020,0110	SQ		ALWAYS	AUTO	
>Bits Allocated	0028,0100	US	8	ALWAYS	AUTO	
>Bits Stored	0028,0101	US	8	ALWAYS	AUTO	
>Columns	0028,0011	US		ALWAYS	AUTO	
>High Bit	0028,0102	US	7	ALWAYS	AUTO	
>Photometric Interpretation	0028,0004	CS	MONOCHROME2	ALWAYS	AUTO	
>Pixel Data	7FE0,0010	O W/ OB		ALWAYS	AUTO	
>Pixel Representation	0028,0103	US	0x0000	ALWAYS	AUTO	
>Rows	0028,0010	US		ALWAYS	AUTO	
>Samples per Pixel	0028,0002	US	1	ALWAYS	AUTO	

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

Table 23: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	The SCP has complete the operation successfully.	
Failed	C603	Image size is larger than Image Box size.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
	C605	Insufficient memory in printer to store the image.	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
	C613	Combined Print Image Size is larger than Image Box size	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user.
Warning	B605	Requested Min Density or Max Density outside of printer's operation range	The N-SET operation is considered successful but the status meaning is logged.
	B609	Image size is larger than Image Box size.	The N-SET operation is considered successful but the status meaning is logged.
	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 N-SET operation is considered successful but the status meaning is logged.
Other	xxxx		The Association is aborted using A-Abort and the print-job is marked as failed. The status meaning is displayed.

4.2.1.3.2.6. SOP Specific Conformance for Printer SOP Class of the Basic Grayscale Print Management Meta SOP Class

The client is retrieving (N_GET) or receiving (N-EVENT-REPORT) the Printer Status. The following is the behavior of the client on getting the printer status through N-GET SCU and N-EVENT-REPORT SCP.

4.2.1.3.2.6.1. Dataset Specific Conformance for Printer SOP Class N-EVENT-REPORT-SCP

The Client is capable of receiving an N-EVENT-REPORT request at any time during the Print Management association. The following table describes the client behavior when receiving an N-EVENT-REPORT-RQ (DICOM attribute 2110,0010)

Table 24: N-EVENT-REPORT behavior

Event Type Name	Event Type ID	Behavior
NORMAL	1	The print-job continues to be printed
WARNING	2	The print-job continues to be printed. The contents of the Printer Name (2110,0030) and Printer Status Info (2110,0020) is logged and reported on the Client screen.
FAILURE	3	The print-job is marked as failed. The contents of Printer Name (2110,0030) and Printer Status Info (2110,0020) is logged and reported on the Client screen.

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

Table 25: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	The request to get printer status information was successful.	
Failure	0110	No Such Event Type	An invalid Event Type ID was supplied in the N-EVENT-REPORT request
	0113	Processing Failure	An internal error occurred during processing of the N-EVENT-REPORT.

4.2.1.3.2.6.2. Dataset Specific Conformance for Printer SOP Class N-GET-SCU

The client uses the Printer SOP class N-GET operation to obtain information about the current printer status. The attributes obtained via N-GET are listed in the table below.

Table 26: N-GET Request Attributes

Attribute Name	Tag	Supported Value
Printer Status	(2110,0010)	Provided by printer
Printer Status Info	(2110,0020)	Provided by printer

The Printer Status information is evaluated as follows:

Table 27: N-GET behavior

Event Type Name	Event Type ID	Behavior
NORMAL	1	The print-job continues to be printed.
WARNING	2	The print-job continues to be printed. The contents of Printer Status Info (2110,0020) is logged and reported to the Client screen
FAILURE	3	The print-job is marked as failed. The contents of Printer Status info (2110,0020) is logged and reported to the user on the client screen.

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

Table 28: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	The request to get printer status information was successful.	
Warning	0101	Received Optional Unsupported Attributes.	The contents of Printer Status Info (2110,0020) is logged and reported to the Client Screen.
	0107	Attribute List Error	
Failure	0110	Print job failed	The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported on the Client Screen.
	0112		
	0118		
	0119		
	0210		
	0211		
	0212		
0213			

4.2.1.4. Association Acceptance Policy

The Client does not provide association acceptance policy

4.2.2. Explorer Platform Server AE

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

4.2.2.1. SOP Classes

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

Table 29: SOP Classes for Explorer Platform Server AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	No	Yes
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Patient Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes
Patient Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes
Study Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Yes	Yes
Study Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes
PatientStudy Only QR Info. Model - FIND SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.1	Yes	Yes
PatientStudy Only QR Info. Model - MOVE SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.2	Yes	Yes
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1	Yes	Yes

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

4.2.2.2. Association Policies

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

4.2.2.2.1. General

The DICOM standard application context is specified below.

Table 30: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

4.2.2.2.2. Number of Associations

The number of simultaneous associations that an Application Entity may support as a Initiator or Acceptor is specified here.

Table 31: Number of associations as an Association Initiator for this AE

Description	Value
Maximum number of simultaneous associations	5 (Storage)3 (Query)2 (Move)

Table 32: Number of associations as an Association Acceptor for this AE

Description	Value
Maximum number of simultaneous associations	This is limited by the hardware platform and overall system performance requirements (nt configurable)

4.2.2.2.3. Asynchronous Nature

Not supported.

4.2.2.2.4. Implementation Identifying Information

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

Table 33: DICOM Implementation Class and Version for Explorer Platform Server AE

Implementation Class UID	1.3.46.670589.46.2.2.1
Implementation Version Name	Philips_EPL_21

4.2.2.2.5. Communication Failure Handling

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

Table 34: Communication Failure Behavior

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

4.2.2.3. Association Initiation Policy

The Application Entity will respond to a received Association rejection as shown in the next table.

Table 35: Association Reject response

Result	Source	Reason/Diagnosis	Behavior
1 - reject-permanent	1 - DICOM UL service-user	1 - no-reason-given	The user is informed and details are logged
		2 - application-context-name-not-support	
		3 - calling-AE-title-not-recognized	
		7 - called-AE-title-not-recognized	
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	
		2 - protocol-version-not-supported	
2 - rejected-transient	3 - DICOM UL service-provider (presentation related function)	1 - temporary-congestion	
		2 - local-limit-exceeded	
		1 - no-reason-given	
	1 - DICOM UL service-user	2 - application-context-name-not-supported	
		3 - calling-AE-title-not-recognized	
		7 - called-AE-title-not-recognized	
		1 - no-reason-given	
	2 - DICOM UL service-provider (ACSE related function)	2 - protocol-version-not-supported	
		1 - temporary congestion	
3 - DICOM UL service-provider (presentation related function)	2 - local-limit-exceeded		

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

Table 36: Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 - DICOM UL service-user (initiated abort)	0 - reason-not-specified	Notifies remote AE, terminates the connection and logs the event.
2 - DICOM UL service-provider (initiated abort)	0 - reason-not-specified	
	1 - unrecognized-PDU	
	2 - unexpected-PDU	
	4 - unrecognized-PDU parameter	
	5 - unexpected-PDU	
	6 - invalid-PDU-parameter value	

4.2.2.3.1. (Real-World) Activity – FIND as SCU

4.2.2.3.1.1. Description and Sequencing of Activities

The Client applications use the iQuery tool of the DICOM Server to initiate and manage DICOM associations with remote application Entities that support the DICOM Query/Retrieve Service as a Service Class Provider. The iQuery tool allows Client applications to interact with the DICOM Server via a proprietary interface. The DICOM Server’s iQuery tool is an interactive end-user application and will generate DICOM transactions based upon end-user initiated activities.

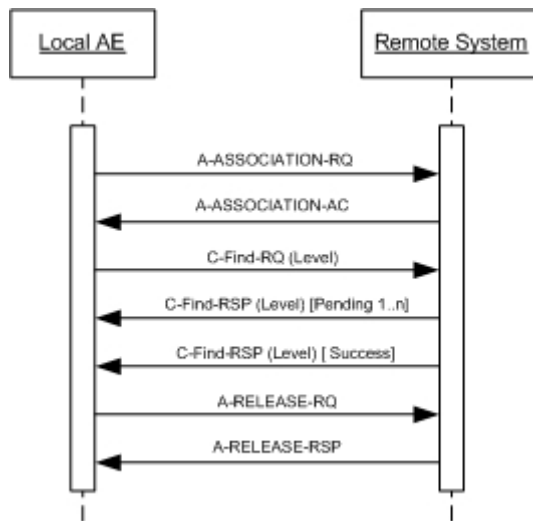


Figure 5: (Real World) Activity - FIND as SCU

4.2.2.3.1.2. Proposed Presentation Contexts

Table 37: 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 QR Information Model - FIND SOP Class	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		
		Implicit VR Little Endian	1.2.840.10008.1.2		
PatientStudy Only QR Info. Model - FIND SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.1	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		
Study Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	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		

4.2.2.3.1.3. SOP Specific Conformance for Patient Root QR Information Model - FIND SOP Class

The iQuery tool provides standard conformance to the DICOM Patient Root Query/Retrieve Information Model FIND SOP class as SCU with the following exceptions.

- Front end of iQuery tool is the Client applications. Client only exposes the Patient name and Patient ID (MRN) s query parameters. Therefore only these values will be used to perform find.
- Patient's Name key attribute matching type is implicitly converted from a single value matching to wildcard matching by adding wildcard "*" character at the end of its value.
- Specific Character set attributes (0008,0005) is set to "ISO_IR 100"

In the event where the preferred query model is no supported, first supported SCP query model will be used in the following order:

- Patient Root Information Model
- Study Root Information Model
- Patient/Study Only Information Model

In none of these models are supported the SCP an error will be logged and association is closed.

4.2.2.3.1.3.1. Dataset Specific Conformance for Patient Root QR Information Model - FIND SOP Class C-FIND-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 38: Supported Query Keys for Patient Root Information Model

Patient Root Information Model				
Attribute Name	Tag	VR	Type Of Matching	Comment
Q/R Patient level				
Patient ID	0010,0020	LO	Single Value, Universal, WildCard	
Patient's Name	0010,0010	PN	Single Value, Universal, WildCard	
Q/R Study level				
Accession Number	0008,0050	SH		
Patient ID	0010,0020	LO	Single Value, Universal	
Study Date	0008,0020	DA		
Study Description	0008,1030	LO		

Study ID	0020,0010	SH		
Study Instance UID	0020,000D	UI	Single Value, Universal	
Study Time	0008,0030	TM		
Q/R Series level				
Body Part Examined	0018,0015	CS		
Modality	0008,0060	CS		
Patient ID	0010,0020	LO	Single Value, Universal	
Series Instance UID	0020,000E	UI		
Series Number	0020,0011	IS		
Study Instance UID	0020,000D	UI	Single Value, Universal	

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

Table 39: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	Continue processing response
Pending	FF00	Current match is supplied	Send A-RELEASE-RQ
	FF01	Matches are continuing but one or more Optional Keys were not supported	Send A-RELEASE-RQ
Cancel	FE00	Matching terminated due to Cancel Request	Stop waiting for response from the SCP

Table 40: Communication Failure Behavior

Exception	Behavior
Timeout	The association is released and the reason is logged
Association Aborted	The association is released and the reason is logged
SCP does not support any of the Query/Retrieve Information Models	The error is logged and the client is notified of the failure and the association is closed

4.2.2.3.1.4. SOP Specific Conformance for PatientStudy Only QR Info. Model - FIND SOP Class (Retired)

The iQuery tool provides standard conformance to the DICOM Patient Study Only Query/Retrieve Information Model FIND SOP class as SCU with the following exceptions.

- Front end of iQuery tool is the Client applications. Client only exposes the Patient name and Patient ID (MRN) s query parameters. Therefore only these values will be used to perform find.
- Patient's Name key attribute matching type is implicitly converted from a single value matching to wildcard matching by adding wildcard "*" character at the end of its value.
- Specific Character set attributes (0008,0005) is set to "ISO_IR 100"

In the event where the preferred query model is no supported, first supported SCP query model will be used in the following order:

- Patient Root Information Model
- Study Root Information Model
- Patient/Study Only Information Model

In none of these models are supported the SCP an error will be logged and association is closed.

4.2.2.3.1.4.1. Dataset Specific Conformance for PatientStudy Only QR Info. Model - FIND SOP Class C-FIND-SCU

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

All DICOM attributes specified as valid keys for C-FIND messages are legal for IB Server query keys as well. In practice the set actually used is defined by client-side requests so only a pertinent subset would be used. The table lists essential tags that IB Server will expect any Query/Retrieve SCP to support for the Patient/Study Only Information Model.

Table 41: Supported Query Keys for Patient/Study Only Information Model

Patient/Study Only Information Model				
Attribute Name	Tag	VR	Type Of Matching	Comment
Q/R Patient level				
Patient ID	0010,0020	LO	Single Value, Universal, WildCard	
Patient's Name	0010,0010	PN	Single Value, Universal, WildCard	
Q/R Study level				
Accession Number	0008,0050	SH		
Patient ID	0010,0020	LO	Single Value, Universal	
Study Date	0008,0020	DA		
Study Description	0008,1030	LO		
Study ID	0020,0010	SH		
Study Instance UID	0020,000D	UI		
Study Time	0008,0030	TM		

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

Table 42: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	Continue processing response.
Pending	FF00	Current match is supplied	Process requests up to the set max number of responses and if the results exceed this number send A-RELEASE-RQ
	FF01	Matches are continuing but one or more Optional Keys were not supported	
Cancel	FE00	Matching terminated due to Cancel Request	Stop waiting for response from the SCP

Table 43: Communication Failure Behavior

Exception	Behavior
Timeout	The association is released and the reason is logged
Association Aborted	The association is released and the reason is logged
SCP does not support any of the Query/Retrieve Information Models	The error is logged and the client is notified of the failure and the association is closed

4.2.2.3.1.5. SOP Specific Conformance for Study Root QR Information Model - FIND SOP Class

The iQuery tool provides standard conformance to the DICOM Study Root Query/Retrieve Information Model FIND SOP class as SCU with the following exceptions.

- Front end of iQuery tool is the Client applications. Client only exposes the Patient name and Patient ID (MRN) s query parameters. Therefore only these values will be used to perform find.
- Patient's Name key attribute matching type is implicitly converted from a single value matching to wildcard matching by adding wildcard "*" character at the end of its value.
- Specific Character set attributes (0008,0005) is set to "ISO_IR 100"

In the event where the preferred query model is no supported, first supported SCP query model will be used in the following order:

- Patient Root Information Model
- Study Root Information Model

- Patient/Study Only Information Model

In none of these models are supported the SCP an error will be logged and association is closed.

4.2.2.3.1.5.1. Dataset Specific Conformance for Study Root QR Information Model - FIND SOP Class C-FIND-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 44: Supported Query Keys for Study Root Information Model

Study Root Information Model				
Attribute Name	Tag	VR	Type Of Matching	Comment
Q/R Study level				
Accession Number	0008,0050	SH		
Patient ID	0010,0020	LO	Single Value, Universal	
Study Date	0008,0020	DA		
Study Description	0008,1030	LO		
Study ID	0020,0010	SH		
Study Instance UID	0020,000D	UI	Single Value, Universal	
Study Time	0008,0030	TM		
Q/R Series level				
Body Part Examined	0018,0015	CS		
Modality	0008,0060	CS		
Series Instance UID	0020,000E	UI		
Series Number	0020,0011	IS		
Study Instance UID	0020,000D	UI	Single Value, Universal	

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

Table 45: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	Continue processing response
Pending	FF00	Current match is supplied	Process requests up to the set max number of responses and if the results exceed this number send A-RELEASE-RQ
	FF01	Matches are continuing but one or more Optional Keys were not supported	
Cancel	FE00	Matching terminated due to Cancel Request	Stop waiting for response from the SCP

Table 46: Communication Failure Behavior

Exception	Behavior
Timeout	The association is released and the reason is logged
Association Aborted	The association is released and the reason is logged
SCP does not support any of the Query/Retrieve Information Models	The error is logged and the client is notified of the failure and the association is closed

4.2.2.3.2. (Real-World) Activity – MOVE as SCU

4.2.2.3.2.1. Description and Sequencing of Activities

The Server will initiate associations for the DICOM Query/Retrieve Service in order to perform pre fetch operations. Inbound information received from Order and Scheduling systems will trigger pre fetch activities within the DICOM Server. Pre fetch activities will cause the DICOM Server to query for and retrieve older DICOM studies form a remote DICOM entity which are determined to be relative to the currently ordered and scheduled studies.

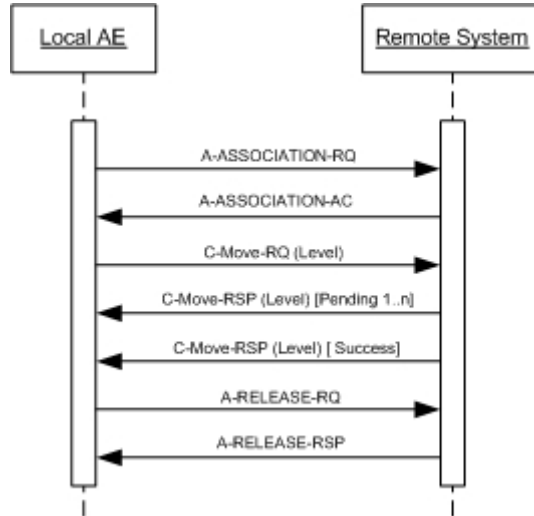


Figure 6: (Real World) Activity - MOVE as SCU

4.2.2.3.2.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 47: 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 QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	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		
PatientStudy Only QR Info. Model - MOVE SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.2	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		
Study Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	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		

4.2.2.3.2.3. SOP Specific Conformance for Patient Root QR Information Model - MOVE SOP Class

The iQuery tool provides standard conformance to the DICOM Patient Root Query/Retrieve Information Model - MOVE SOP Class as an SCU with the following exception. C-MOVE requests are submitted for study level only.

4.2.2.3.2.3.1. Dataset Specific Conformance for Patient Root QR Information Model - MOVE SOP Class C-MOVE-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 48: Identifiers for MOVE Patient Root Information Model as SCU

Patient Root Information Model			
Attribute Name	Tag	VR	Comment
Q/R Study level			
Patient ID	0010,0020	LO	
Study Instance UID	0020,000D	UI	

Table 49: C-MOVE-RQ Response Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	Log the event in iQuery tool
Failed	A701	C-MOVE failure refused cannot calculate	Log failed in iQuery tool on server and close the association
	A702	C-MOVE failure refused cannot perform	
	A801	C-MOVE failure refused destination unknown	
	A900	C-MOVE failure invalid dataset	
	C001	C-MOVE failure unable to process	
Warning	B000	One or more failure unable to process	Log failed in iQuery tool on server and close the association
Pending	FF00	Current match is supplied	If none of the sub-operations have failed continue reading DICOM C-MOVE-RSP message. If any of the sub-operations have failed submit C-CANCEL-MOVE-RQ to the remote application entity is sent.
Cancel	FE00	C-MOVE cancel request received	Log failed in iQuery tool on server and close the association.

Table 50: Communication Failure Behavior

Exception	Behavior
Timeout	If the Query/Retrieve SCP does not respond within the configure time period for a submitted C-MOVE request the C-CANCEL-MOVE-RQ is submitted and an error is logged in the iQuery tool. Association is closed and the request is retried for a configure amount at a configure duration.
Association Aborted	The request is retried for a configure amount of time at a configure duration.

4.2.2.3.2.4. SOP Specific Conformance for PatientStudy Only QR Info. Model - MOVE SOP Class (Retired)

The iQuery tool provides standard conformance to the DICOM Patient/Study only Query/Retrieve Information Model - Move SOP Class as an SCU with the following exception. C-MOVE requests are submitted for STUDY level only

4.2.2.3.2.4.1. Dataset Specific Conformance for PatientStudy Only QR Info. Model - MOVE SOP Class C-MOVE-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 51: Identifiers for MOVE Patient/Study Only Information Model as SCU

Patient/Study Only Information Model			
Attribute Name	Tag	VR	Comment
Q/R Study level			
Patient ID	0010,0020	LO	
Study Instance UID	0020,000D	UI	

Table 52: C-MOVE-RQ Response Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	Log the event in iQuery tool
Failed	A701	C-MOVE failure refused cannot calculate	Log failed in iQuery tool on server and close the association
	A702	C-MOVE failure refused cannot perform	
	A801	C-MOVE failure refused destination unknown	
	A900	C-MOVE failure refused invalid dataset	
	C001	C-MOVE failure unable to process	
Warning	B000	One or more failures	Log failed in iQuery tool on server and close the association.
Pending	FF00	Current match is supplied	If none of the sub-operations have failed continue reading DICOM C-MOVE-RSP message. If any of the sub-operations have failed submit C-CANCEL-MOVE_RQ to the remote application entity is sent.
Cancel	FE00	C-MOVE cancel request received	Log failed in iQuery on server and close the association.

Table 53: Communication Failure Behavior

Exception	Behavior
Timeout	If the Query/Retrieve SCP does not respond within a configure time period for a submitted C-MOVE request the C-CANCEL-MOVE-RQ is submitted and an error is logged in the iQuery tool. Association is closed and the request is retried for a configure amount of time at a configure duration.
Association Aborted	The request is retried for a configure amount of time at a configure duration.

4.2.2.3.2.5. SOP Specific Conformance for Study Root QR Information Model - MOVE SOP Class

The iQuery tool provides standard conformance to the DICOM Study Root Query/Retrieve Information Model - MOVE SOP Class as an SCU with the following exception. C-MOVE request are submitted for STUDY level only.

Study Root Query/Retrieve Information Model - MOVE will be used as the preferred model when the SCP supports a multiple Query/Retrieve Information Models including Study Root Model.

4.2.2.3.2.5.1. Dataset Specific Conformance for Study Root QR Information Model - MOVE SOP Class C-MOVE-SCU

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 54: Identifiers for MOVE Study Root Information Model as SCU

Study Root Information Model			
Attribute Name	Tag	VR	Comment
Q/R Study level			
Study Instance UID	0020,000D	UI	

Table 55: C-MOVE-RQ Response Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	Log the event in iQuery tool.
Failed	A701	C-MOVE failure refused cannot calculate	Log failed in iQuery tool on server and close the association.
	A702	C-MOVE failure refused cannot perform	
	A801	C-MOVE failure refused destination unknown	
	A900	C-MOVE failure invalid dataset	
	C001	C-MOVE failure unable to process.	
Warning	B000	One or more failures	Log failed in iQuery tool on server and close the association.
Pending	FF00	Current match is supplied	If none of the sub-operations have failed continue reading DICOM C-MOVE-RSP message. If any of the sub-operations have failed submit C-CANCEL-MOVE-RQ to the remote application entity is sent.
Cancel	FE00	C-MOVE cancel request received	Log failed in iQuery tool on server and close the association.

Table 56: Communication Failure Behavior

Exception	Behavior
Timeout	If the Query/Retrieve SCP does not respond within a configure time period for a submitted C-MOVE request the C-CANCEL-MOVE-RQ is submitted and an error is logged in the iQuery tool. Association is closed and the request is retried for a configure amount of time at the configure duration.
Association Aborted	The request is retried for a configure amount of time at a configure duration

4.2.2.3.3. (Real-World) Activity – Image Export

4.2.2.3.3.1. Description and Sequencing of Activities

Client application used the iExport tool of the Server to initiate and manage DICOM associations with remote Application Entities that support the DICOM Storage service as a Service Class Provider. The iExport tool allows client applications to export DICOM Objects through (C-STORE SCU)

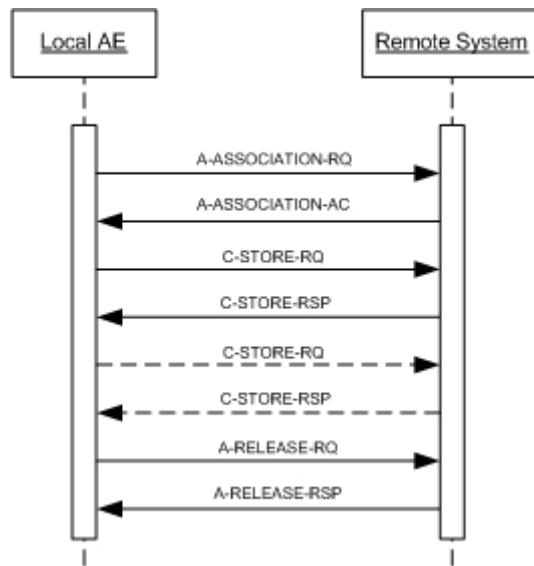


Figure 7: (Real World) Activity - STORE as SCU

4.2.2.3.3.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 57: 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		
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
		RLE Lossless	1.2.840.10008.1.2.5		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		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				

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
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		

4.2.2.3.3.3. SOP Specific Conformance for Storage SOP Classes

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

4.2.2.3.3.3.1. Dataset Specific Conformance for C-STORE-RQ

Detail regarding the Dataset Specific response behavior will be reported in this section.

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

Table 58: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful stored	
Failure	xxxx	Failed to store	Log the error in the iExport tool log file and retry the C-STORE-RQ a configure amounts of time after a configure period of time.

Table 59: Communication Failure Behavior

Exception	Behavior
Association aborted	Log the error in the iExport tool log file and C-STORE-RQ is retried a configure number of times at a configure period of time.
Rejected, Image type is not supported by the remote Application Entity (Unacceptable service)	Log the error in the iExport tool log file and continue on sending the next image in the series.

4.2.2.4. Association Acceptance Policy

The Application Entity may reject Association attempts as shown in the table below.

Table 60: Association Reject Reasons

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

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

Table 61: Association Abort Handling

Source	Reason/Diagnosis	Behavior
0 - DICOM UL service-user (initiated abort)	0 - reason-not-specified	When received, terminates the connection and logs the event.
2 - DICOM UL service provider (initiated abort)	0 - reason-not-specified	
	1 - unrecognized-PDU	
	2 - unexpected-PDU	
	4 - unrecognized-PDU parameter	
	5 - unexpected-PDU parameter	
	6 - invalid-PDU-parameter value	

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

4.2.2.4.1.1. Description and Sequencing of Activities

The IB DICOM Server will accept and process request for Verification Service that are initiated by remote DICOM entities.

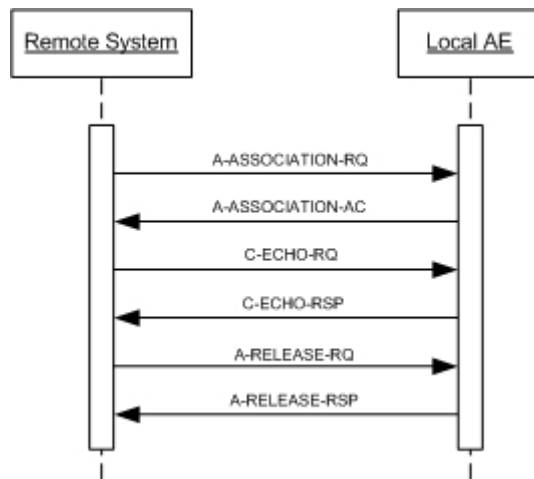


Figure 8: (Real World) Activity - ECHO as SCP

4.2.2.4.1.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 62: 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		

4.2.2.4.1.3. SOP Specific Conformance for Verification SOP Class

This section and sub-section include the manufacturer SOP and Dataset specific information as well the status codes and their corresponding behavior.

4.2.2.4.1.3.1. Dataset Specific Conformance for Verification C-ECHO SCP

Detail regarding the Dataset Specific response behavior will be reported in this section.

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

Table 63: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	

4.2.2.4.2. (Real-World) Activity – FIND as SCP

4.2.2.4.2.1. Description and Sequencing of Activities

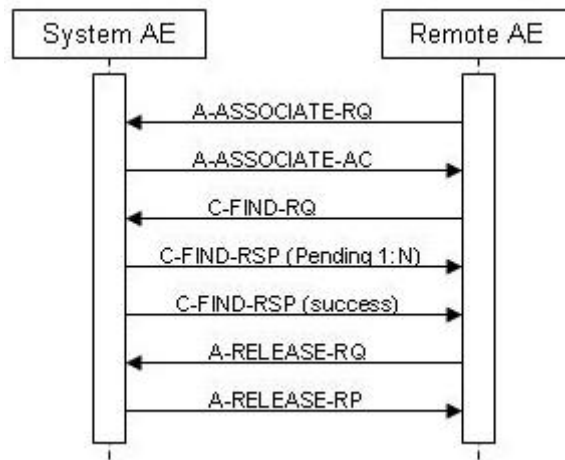


Figure 9: (Real World) Activity - Find as SCP

4.2.2.4.2.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 64: Acceptable Presentation Contexts for (Real-World) Activity – FIND as SCP

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	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		
PatientStudy Only QR Info. Model - FIND SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.1	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		
Study Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	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		

4.2.2.4.2.3. SOP Specific Conformance for Patient Root QR Information Model - FIND SOP Class

The Query/Retrieve SCP provides standard conformance to the Patient Root Q/R Information Model - FIND SOP Class.

4.2.2.4.2.3.1. Dataset Specific Conformance for Patient Root QR Information Model - FIND SOP Class C-FIND-SCP

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 65: Requested Query Keys for Patient Root Information Model

Patient Root Information Model				
Attribute Name	Tag	VR	Type Of Matching	Comment
Query/Retrieve Level	0008,0052	CS	Single Value	
Retrieve AE Title	0008,0054	AE		
Specific Character Set	0008,0005	CS		
Q/R Patient level				
Patient ID	0010,0020	LO	Single Value, Universal, WildCard	
Patient's Birth Date	0010,0030	DA	Range, Single Value, Universal	Optional attribute, returned existence whether or not part of the request.
Patient's Name	0010,0010	PN	Single Value, Universal, WildCard	
Patient's Sex	0010,0040	CS	Single Value, Universal, WildCard	Optional attribute, returned existence whether or not part of the request.
Q/R Study level				
Accession Number	0008,0050	SH	Single Value, Universal, WildCard	
Modalities in Study	0008,0061	CS	Single Value, Universal	Optional attribute
Number of Study Related Instances	0020,1208	IS	Universal	Optional attribute, not used in matching but returned existence.
Number of Study Related Series	0020,1206	IS	Universal	Optional attribute, not used in matching but returned existence.
Patient ID	0010,0020	LO	Single Value	
Referring Physician's Name	0008,0090	PN	Single Value, Universal, WildCard	Optional attribute
Study Date	0008,0020	DA	Range, Single Value, Universal	
Study Description	0008,1030	LO		Optional attribute, not used in matching but returned existence whether or not part of the request.
Study ID	0020,0010	SH	Single Value, Universal, WildCard	
Study Instance UID	0020,000D	UI	List Of UID, Single Value, Universal	
Study Time	0008,0030	TM	Range, Single Value, Universal	
Q/R Series level				
Body Part Examined	0018,0015	CS	Universal	
Modality	0008,0060	CS	Single Value, Universal	
Number of Series Related Instances	0020,1209	IS	Universal	Optional attribute, not used in matching but returned existence.
Patient ID	0010,0020	LO	Single Value	
Performed Procedure Step Start Date	0040,0244	DA	Range, Single Value, Universal	
Performed Procedure Step Start Time	0040,0245	TM	Range, Single Value, Universal	
Series Instance UID	0020,000E	UI	List Of UID, Single Value, Universal	
Series Number	0020,0011	IS	Single Value, Universal	
Study Instance UID	0020,000D	UI	Single Value	

Request Attributes Sequence	0040,0275	SQ		Optional attribute, matching is performed up to 1 item level
>Requested Procedure ID	0040,1001	SH	Single Value, Universal, WildCard	
>Scheduled Procedure Step ID	0040,0009	SH	Single Value, Universal, WildCard	
Q/R Image level				
Image Type	0008,0008	CS	Universal	
Instance Number	0020,0013	IS	Single Value, Universal	
Patient ID	0010,0020	LO	Single Value	
Series Instance UID	0020,000E	UI	Single Value	
SOP Instance UID	0008,0018	UI	Single Value	
Study Instance UID	0020,000D	UI	Single Value	

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

Table 66: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete	A response is sent with this status code.
Failed	A700	Out of resources	Logged and release association.
	A900	Invalid dataset	A response is sent with this status code. The reason is logged in the file.
	C000	Unable to process	A response is sent with this status code. The reason is logged in the file.
	C001	Unable to process due to missing unique tags	A response is sent with this status code. The reason is logged in the file.
Pending	FF00	Current match is supplied	Matches are continuing; Current match is supplied.
Cancel	FE00	Matching terminated due to Cancel Request	No more C-FIND Pending responses will be sent and a final response is sent with this status code. Cancel Request is logged.

Table 67: Communication Failure Behavior

Exception	Behavior
Timeout	The association is released and the reason is logged
Association Aborted	The association is released and the reason is logged

4.2.2.4.2.4. SOP Specific Conformance for PatientStudy Only QR Info. Model - FIND SOP Class (Retired)

The Query/Retrieve SCP provides standard conformance to the Patient/Study Only Q/R Information Model - FIND SOP Class

4.2.2.4.2.4.1. Dataset Specific Conformance for PatientStudy Only QR Info. Model - FIND SOP Class C-FIND-SCP

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 68: Requested Query Keys for Patient/Study Only Information Model

Patient/Study Only Information Model				
Attribute Name	Tag	VR	Type Of Matching	Comment
Query/Retrieve Level	0008,0052	CS	Single Value	
Retrieve AE Title	0008,0054	AE		
Specific Character Set	0008,0005	CS		
Q/R Patient level				
Patient ID	0010,0020	LO	Single Value, Universal	
Patient's Birth Date	0010,0030	DA	Range, Single Value,	Optional attribute, returned existence whether or not part of the

			Universal	request
Patient's Name	0010,0010	PN	Single Value, Universal, WildCard	
Patient's Sex	0010,0040	CS	Single Value, Universal, WildCard	Optional attribute, returned existence whether or not part of the request
Q/R Study level				
Accession Number	0008,0050	SH	Single Value, Universal, WildCard	
Modalities in Study	0008,0061	CS	Single Value, Universal	
Number of Study Related Instances	0020,1208	IS	Universal	Optional attribute, returned existence whether or not part of the request
Number of Study Related Series	0020,1206	IS	Universal	Optional attribute, returned existence whether or not part of the request
Patient ID	0010,0020	LO	Single Value	
Referring Physician's Name	0008,0090	PN	Single Value, Universal, WildCard	Optional attribute
Study Date	0008,0020	DA	Range, Single Value, Universal	
Study Description	0008,1030	LO		Optional attribute, not used in matching but returned existence whether or not part of the request
Study ID	0020,0010	SH	Single Value, Universal, WildCard	
Study Instance UID	0020,000D	UI	List Of UID, Single Value, Universal	
Study Time	0008,0030	TM	Range, Single Value, Universal	

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

Table 69: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete	A response is sent with this status code.
Failure	A700	Out of resources	Logged an release association.
	A900	Invalid dataset	A response is sent with this status code. The reason is logged in the file..
	C000	Unable to process	A response is sent with this status code. The reason is logged in the file.
	C001	Unable to process due to missing unique tags	A response is sent with this status code. The reason is logged in the file.
Pending	FF00	Current match is supplied	Matching are continuing; Current match is supplied.
Cancel	FE00	Matching terminated due to Cancel Request	No more C-FIND pending responses will be sent and a final response is sent with this status code. Cancel request is logged.

Table 70: Communication Failure Behavior

Exception	Behavior
Timeout	The association is released and the reason is logged
Association Aborted	The association is released and the reason is logged

4.2.2.4.2.5. SOP Specific Conformance for Study Root QR Information Model - FIND SOP Class

The Query/Retrieve SCP provider standard conformance to the Study Root Q/R Information Model - FIND SOP Class

4.2.2.4.2.5.1. Dataset Specific Conformance for Study Root QR Information Model - FIND SOP Class C-FIND-SCP

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 71: Requested Query Keys for Study Root Information Model

Study Root Information Model				
Attribute Name	Tag	VR	Type Of Matching	Comment
Query/Retrieve Level	0008,0052	CS	Single Value	
Retrieve AE Title	0008,0054	AE		
Specific Character Set	0008,0005	CS		
Q/R Study level				
Accession Number	0008,0050	SH	Single Value, Universal, WildCard	
Modalities in Study	0008,0061	CS	Single Value, Universal	Optional attribute
Number of Study Related Instances	0020,1208	IS	Universal	Optional attribute, not used in matching but returned in existence
Number of Study Related Series	0020,1206	IS	Universal	Optional attribute, not used in matching but returned existence
Patient ID	0010,0020	LO	Single Value, Universal, WildCard	
Patient's Birth Date	0010,0030	DA	Range, Single Value	Optional attribute, returned existence whether or not part of the request
Patient's Name	0010,0010	PN	Single Value, Universal, WildCard	
Patient's Sex	0010,0040	CS	Single Value, WildCard	Optional attribute, returned existence whether or not part of the request
Referring Physician's Name	0008,0090	PN	Single Value, Universal, WildCard	Optional attribute
Study Date	0008,0020	DA	Range, Single Value, Universal	
Study Description	0008,1030	LO		Optional attribute, not used in matching but returned existence whether or not part of the request
Study ID	0020,0010	SH	Single Value, Universal, WildCard	
Study Instance UID	0020,000D	UI	List Of UID, Single Value, Universal	
Study Time	0008,0030	TM	Range, Single Value, Universal	
Q/R Series level				
Body Part Examined	0018,0015	CS	Universal	
Modality	0008,0060	CS	Single Value, Universal	
Number of Series Related Instances	0020,1209	IS	Universal	Optional attribute, not used in matching but returned existence
Performed Procedure Step Start Date	0040,0244	DA	Range, Single Value, Universal	
Performed Procedure Step Start Time	0040,0245	TM	Range, Single Value, Universal	
Series Instance UID	0020,000E	UI	List Of UID, Single Value, Universal	
Series Number	0020,0011	IS	Single Value, Universal	
Study Instance UID	0020,000D	UI	Single Value	
Request Attributes Sequence	0040,0275	SQ		Optional attribute matching is performed up to 1 item level
>Requested Procedure ID	0040,1001	SH	Single Value, Universal, WildCard	
>Scheduled Procedure Step ID	0040,0009	SH	Single Value, Universal,	

Wildcard			
Q/R Image level			
Image Type	0008,0008	CS	Universal
Instance Number	0020,0013	IS	Single Value, Universal
Series Instance UID	0020,000E	UI	Single Value
SOP Instance UID	0008,0018	UI	List Of UID, Single Value, Universal
Study Instance UID	0020,000D	UI	Single Value

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

Table 72: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete	A response is sent with this status code.
Failure	A700	Out of resources	Logged and released association.
	A900	Invalid dataset	A response is sent with this status code. The reason is logged in the file.
	C000	Unable to process	A response is sent with this status code. The reason is logged in the file.
	C001	Unable to process due to missing unique tags	A response is sent with this status code. The reason is logged in the file.
Pending	FF00	Current match is supplied	Matches are continuing; Current match is supplied.
Cancel	FE00	Matching terminated due to Cancel Request	No more C-Find pending responses will be sent an a final response is sent with this status code. Cancel Request is logged.

Table 73: Communication Failure Behavior

Exception	Behavior
Timeout	The association is released and the reason is logged
Association Aborted	The association is released and the reason is logged

4.2.2.4.3. (Real-World) Activity – MOVE as SCP

4.2.2.4.3.1. Description and Sequencing of Activities

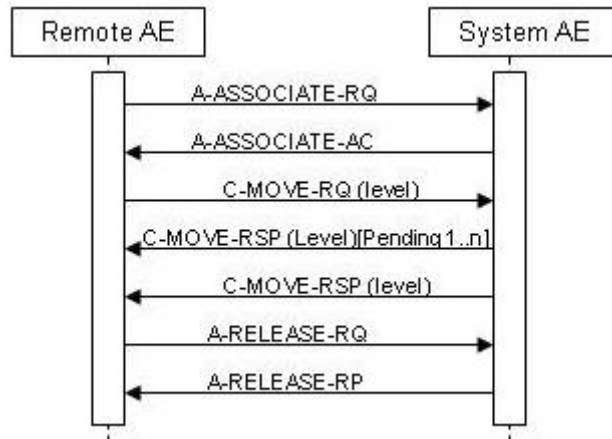


Figure 10: Sequence of C-Move as SCP

4.2.2.4.3.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 74: Acceptable Presentation Contexts for (Real-World) Activity – MOVE as SCP

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	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		
PatientStudy Only QR Info. Model - MOVE SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.2	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		
Study Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	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		

4.2.2.4.3.3. SOP Specific Conformance for Patient Root QR Information Model - MOVE SOP Class

The Query/Retrieve as SCP provides standard conformance to study Patient Root Query/Retrieve Information Model - MOVE SOP class. A C-STORE association is built after the C-MOVE request.

4.2.2.4.3.3.1. Dataset Specific Conformance for Patient Root QR Information Model - MOVE SOP Class C-MOVE-SCP

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 75: Identifiers for MOVE Patient Root Information Model as SCP

Patient Root Information Model			
Attribute Name	Tag	VR	Comment
Query/Retrieve Level	0008,0052	CS	
Q/R Patient level			
Patient ID	0010,0020	LO	
Q/R Study level			
Patient ID	0010,0020	LO	
Study Instance UID	0020,000D	UI	
Q/R Series level			
Patient ID	0010,0020	LO	
Series Instance UID	0020,000E	UI	
Study Instance UID	0020,000D	UI	
Q/R Image level			
Patient ID	0010,0020	LO	
Series Instance UID	0020,000E	UI	
SOP Instance UID	0008,0018	UI	
Study Instance UID	0020,000D	UI	

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

Table 76: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Sub-operations complete - No failures	A response with this status code is sent.
Failed	A700	Out of resources	Logged and released association.
	A900	Invalid dataset	A response with this status code is sent. The reason is logged in the file.
	C001	Unable to process	A response with this status code is sent. The reason is logged in the file.
Warning	B000	Sub-operations complete - 1 or more failures	A response with this status code is sent when 1 or more export jobs fail.
Pending	FF00	Sub-operations are continuing	A response with this status code is sent.
Cancel	FE00	Sub-operations are terminated due to cancel request	A response with this status code is sent. Cancel request is sent to export work item. The reason is logged in the file.

Table 77: Communication Failure Behavior

Exception	Behavior
Timeout	The association is released and the reason is logged.
Association Aborted	The association is released and the reason is logged.

4.2.2.4.3.4. SOP Specific Conformance for PatientStudy Only QR Info. Model - MOVE SOP Class (Retired)

The Query/Retrieve as SCP provides standard conformance to Patient/Study only Query/Retrieve Information Model - MOVE SOP class. A C-STORE association is built after the C-MOVE request.

4.2.2.4.3.4.1. Dataset Specific Conformance for PatientStudy Only QR Info. Model - MOVE SOP Class C-MOVE-SCP

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 78: Identifiers for MOVE Patient/Study Only Information Model as SCP

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

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

Table 79: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Sub-operations complete - No failures	A response with this status code is sent.
Failed	A700	Out of resources	Logged and released association.
	A900	Invalid dataset	A response with this status code is sent. The reason is logged in the file.
	C001	Unable to process	A response with this status code is sent. The reason is logged in the file.
Warning	B000	Sub-operations complete - 1 or more failures	A response with this status code is sent when 1 or more export jobs fail.
Pending	FF00	Sub-operations are continuing	A response with this status code is sent.
Cancel	FE00	Sub-operations are terminated due to cancel request	A response with this status code is sent. Cancel request is sent to export work item. The reason is logged in the file.

Table 80: Communication Failure Behavior

Exception	Behavior
Timeout	The association is released and the reason is logged.
Association Aborted	The association is released and the reason is logged.

4.2.2.4.3.5. SOP Specific Conformance for Study Root QR Information Model - MOVE SOP Class

The Query/Retrieve as SCP provides standard conformance to Study Root Query/Retrieve Information Model - MOVE SOP class. A C-STORE association is built after the C-MOVE request.

4.2.2.4.3.5.1. Dataset Specific Conformance for Study Root QR Information Model - MOVE SOP Class C-MOVE-SCP

Detail regarding the Dataset Specific response behavior will be reported in this section.

Table 81: Identifiers for MOVE Study Root Information Model as SCP

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

Q/R Image level			
Series Instance UID	0020,000E	UI	
SOP Instance UID	0008,0018	UI	
Study Instance UID	0020,000D	UI	

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

Table 82: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Sub-operations complete - No Failures	A response with this status code is sent.
Failed	A700	Out of resources	Logged and released association.
	A900	Invalid dataset	A response with this status code is sent. The reason is logged in the file
	C001	Unable to process	A response with this status code is sent. The reason is logged in the file
Warning	B000	Sub-operations complete - 1 or more failures	A response with this status code is sent when 1 or more export jobs fail.
Pending	FF00	Sub-operations are continuing	A response with this status code is sent.
Cancel	FE00	Sub-operations are terminated due to cancel request	A response with this status code is sent. Cancel request is sent to export work item. The reason is logged in the file.

Table 83: Communication Failure Behavior

Exception	Behavior
Timeout	The association is released and the reason is logged.
Association Aborted	The association is released and the reason is logged.

4.2.2.4.4. (Real-World) Activity – Image Import

4.2.2.4.4.1. Description and Sequencing of Activities

The Server will accept DICOM Storage Service association requests that are initiated by remote DICOM entities. The Server will process the stored DICOM images and make them available for access by Client applications.

The Client application (viewer) accepts only images of the SOP Classes:

- MR Image Storage SOP class and
- Secondary Capture Storage SOP class

With modality type MR or OT and supported with the information of the SOP classes:

- Grayscale Softcopy Presentation State Storage and
- 3D Volume Storage new private SOP class

Strict rules are defined for doing analyze on the images.

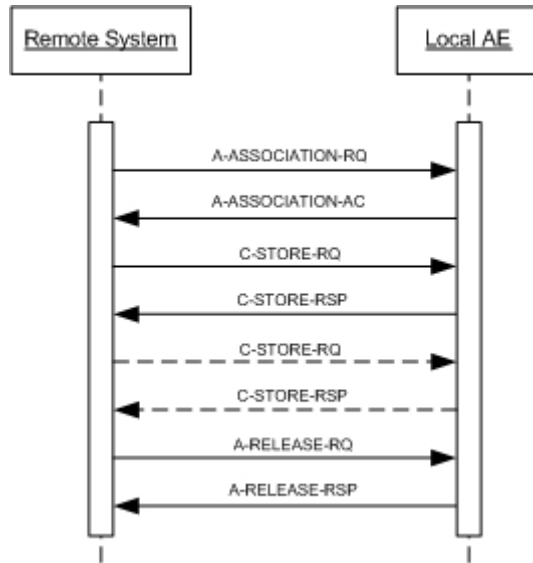


Figure 11: (Real World) Activity - STORE as SCP

4.2.2.4.4.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 84: 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		
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1	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		
Grayscale 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		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
		RLE Lossless	1.2.840.10008.1.2.5		
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
		RLE Lossless	1.2.840.10008.1.2.5		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51		
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		
		JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91		
		JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
		RLE Lossless	1.2.840.10008.1.2.5		

The Server will examine the Transfer Syntaxes for a given Presentation Context in the order that they are presented in the Association Request. The first proposed Transfer Syntax that matches a support Transfer Syntax will be accepted for each supported proposed Presentation Context.

4.2.2.4.4.3. SOP Specific Conformance for Storage SOP Classes

The C-Store SCP will receive any DICOM objects (images and non-image objects) transmitted in the open associated provided that the correct presentation context is used. If the object are received successfully, they are stored and registered in the Server local database; from there they can be loaded (and viewed) via the available viewers. Objects are stored in the local database as files.

If the objects are not received successfully then they are placed in the error folder.

4.2.2.4.4.3.1. Dataset Specific Conformance for C-STORE-RSP

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

The Server conforms to the SOPs of the Storage Service Class at level 2(Full). No elements are discarded, but some demographic elements may be modified.

Table 85: Attributes that may be modified by the Server

Attribute Name	Tag
Accession Number	(0008,0050)
Referring Physician	(0008,0090)
Procedure Sequence	(0008,1032)
> Code Value	(0008,0100)
> Code Meaning	(0008,0104)
Patient Name	(0010,0010)
Patient ID	(0010,0020)
Patient Birth Date	(0010,0030)
Patient Sex	(0010,0040)
Requesting Physician	(0032,1032)

Modification of data elements is initiated either by processing of manual edits initiated by end users of the system.

Remote DICOM SCUs are able to request high priority processing of DICOM requests by negotiating their DICOM associations with the configurable high priority Application Entity Title of the DICOM Server. High priority DICOM Storage requests are processed ahead of other pending requests for normal priority storage. The application entity returns the status code of "0" if the receipt of C-STORE message was successful; otherwise it returns one of the following codes: Behavior of an Application Entity SOP class is summarized as shown in next Tables The standard as well as the manufacturer specific status codes and their corresponding behavior are specified.

Table 86: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful stored	Server succeeds with store operation and required DICOM was stored.
Failure	A700	Refused: Out of Resources	There is insufficient storage in the server. Caller should try again later. Critical error is logged in iSyntax log file.

4.3. Network Interfaces

4.3.1. Physical Network Interfaces

The IB Server provides only DICOM V3.0 TCP/IP Network Communication Support as defined in PS 3.8 of the standard.

TCP/IP is the only protocol stack supported:

Supported physical medium include:

- IEEE 802.3-1995 100BASE-TX (Fast Ethernet)
- IEEE 802.3 1000BASE-X (Fiber Optic Gigabit Ethernet).

1000BASE-X is preferred, especially when using MR data.

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 are 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 is described here.

4.4.1.1. Local AE Titles

The local AE title mapping and configuration are specified as:

Table 87: AE Title configuration table

Application Entity	Default AE Title	Default TCP/IP Port
Explorer Platform Server AE	PHILIPS_SCP (Import)	104
	PHILIPS_SCU (Export)	
	PHILIPS_QRU (iQuery)	107
Explorer Platform Client AE	PHILIPS_QRP	
	PHILIPS_SCP	104

4.4.1.2. Remote AE Title/Presentation Address Mapping

The Server can be configured to accept all systems for import of images.

For Printing, iExport, iQuery the IP-address, AE-Title and Port number must be defined.

4.4.2. Parameters

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

Table 88: Configuration Parameters Table

Parameter	Configurable	Default Value
General Parameter		
Time-out waiting for acceptance or rejection Response to an Association Open Request (Application Level timeout)	Yes	60sec
Retry Delay	Yes	10min
AE Specific Parameters		
Maximum PDU size the AE can receive - Server	Yes	Max 63 K

Parameter	Configurable	Default Value
Maximum PDU size the AE can send - Server	Yes	Max 63 K
Maximum PDU size the AE can send - Client (Printer)	Yes	Max 28 K
Number of simultaneous Associations by Service and/or SOP Class – Storage SCP	Yes	20, max 50
Number of simultaneous Associations by Service and/or SOP Class – Storage SCU	No	5
Number of simultaneous Associations by Service and/or SOP Class – Query	No	3
Number of simultaneous Associations by Service and/or SOP Class – Move	No	2

5. Media Interchange

5.1. Implementation model

The implementation model identifies the DICOM Application Entities for Media in specific implementation and relates the Application Entities to Real-World Activities.

5.1.1. Application Data Flow Diagram

Not applicable

5.1.2. Functional Definitions of AE's

- Not applicable

5.1.3. Sequencing of Real World Activities

Not applicable.

5.2. AE Specifications

Not applicable

5.3. Augmented and Private Application Profiles

Not applicable

5.4. Media Configuration

Not applicable

6. Support of Character Sets

Any support for character sets in Network and Media services is described here.

Table 89: Supported DICOM Character Sets

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

7.1. Security Profiles

Not applicable

7.1.1. Security use Profiles

Not applicable

7.1.2. Security Transport Connection Profiles

Not applicable

7.1.3. Digital Signature Profiles

Not applicable

7.1.4. Media Storage Security Profiles

Not applicable

7.1.5. Attribute Confidentiality Profiles

Not applicable

7.1.6. Network Address Management Profiles

Not applicable

7.1.7. Time Synchronization Profiles

Not applicable

7.1.8. Application Configuration Management Profiles

Not applicable

7.1.9. Audit Trail Profiles

Not applicable

7.2. Association Level Security

Not applicable

7.3. Application Level Security

Not applicable

8. Annexes of application "Cardiac Explorer"

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 90: 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
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1

8.1.1.2. Secondary Capture Image Storage SOP Class

Table 91: 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
Study	Patient 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

Table 92: Patient Module

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

Table 93: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Accession Number	0008,0050	SH		VNAP	COPY	
Referring Physician's Name	0008,0090	PN		VNAP	COPY	
Study Date	0008,0020	DA		VNAP	COPY	
Study ID	0020,0010	SH		VNAP	COPY	
Study Instance UID	0020,000D	UI		ALWAYS	COPY	
Study Time	0008,0030	TM		VNAP	COPY	

Table 94: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Patient's Weight	0010,1030	DS		ANAPCV	COPY	

Table 95: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Laterality	0020,0060	CS		ANAP	COPY	
Performing Physician's Name	0008,1050	PN		ANAPCV	COPY	
Protocol Name	0018,1030	LO		ANAPCV	COPY	
Series Date	0008,0021	DA		ANAPCV	AUTO	
Series Description	0008,103E	LO		ANAPCV	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		VNAP	AUTO	
Series Time	0008,0031	TM		ANAPCV	AUTO	
Performed Procedure Step Description	0040,0254	LO		ALWAYS	COPY	
Performed Procedure Step ID	0040,0253	SH		ALWAYS	COPY	

Performed Procedure Step Start Date	0040,0244	DA		ALWAYS	COPY	
Performed Procedure Step Start Time	0040,0245	TM		ALWAYS	AUTO	Copied from original and change to hhmss

Table 96: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Institution Name	0008,0080	LO		ANAPCV	COPY	
Manufacturer	0008,0070	LO	Philips Medical Systems	VNAP	FIXED	
Manufacturer's Model Name	0008,1090	LO		ANAPCV	CONFIG	
Software Version(s)	0018,1020	LO	Value 1: ViewForum 8.3	ANAPCV	COPY	

Table 97: SC Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Conversion Type	0008,0064	CS	WSD	ALWAYS	FIXED	
Modality	0008,0060	CS	SC	ANAPCV	FIXED	

Table 98: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Comments	0020,4000	LT	MR Cardiac Report Page, ca	ANAP	FIXED	
Image Type	0008,0008	CS	Value 1: DERIVED, Value 2: SECONDARY	ALWAYS	FIXED	
Instance Number	0020,0013	IS		ALWAYS	AUTO	
Patient Orientation	0020,0020	CS		ANAPCV	AUTO	

Table 99: Image Pixel Module

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

Table 100: 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	ALWAYS	COPY	
SOP Instance UID	0008,0018	UI		ALWAYS	COPY	
Specific Character Set	0008,0005	CS	ISO_IR 100	ANAP	AUTO	

8.1.2. Usage of Attributes from Received IOD

The following table describes the functionality which can be used by this application. For each functionality is listed the required DICOM attributes in order to use the application.

The columns must read as follow:

Functionality The name of the functionality

- **Type1**, this function can be used if Type 1 and Type 2 attributes are available with the restriction that Type 1 attributes has a value and Type 2 attributes may be empty.
- **Optional**, this functional uses DICOM attributes of Type 2 and Type 3 with a value. The Optional attributes are listed in a separate table in this section.
- **Private**, this function needs DICOM Private attributes.

A combination of Type1, Optional and/or Private attributes is possible.

Table 101: Functionalities

Functionality	Type1	Optional	Private
Cardiac Explorer viewer	X	X	X

8.1.2.1. Usage of the Functionality Cardiac Explorer viewer

The DICOM attributes used for the functionalities of this Multi-Vendor system will be defined in a separate document for every Vendor.

The Cardiac Explorer Viewer can open images with modality = "MR" on the SOP Classes as defined in the table below:

Table 102: Supported SOP Classes for functionality Cardiac Explorer viewer

SOP Class name	SOP Class UID
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1

8.1.3. Attribute Mapping

Not applicable.

8.1.4. Coerced/Modified fields

Not applicable.

8.2. Data Dictionary of Private Attributes

The DynaSuite Cardiac adds additional six private attributes during export. These attributes are listed in the table below.

Table 103: Data Dictionary of Private Attributes

Tag	Attribute Name	VR	VM	Attribute Description	Location
(0073,1002)	Stentor Remote IP-Address Element	UT	1	Stores the remote IP-address of where the study came from	Study level of a study's composite
(0073,1003)	Stentor Remote AETitle Element	UT	1	Stores the remote AE-Title of where the study came from	Study level of a study's composite
(0073,1004)	Stentor Local AETitle Element	UT	1	Name/Value for remote AE-Title	Study level of a study's composite
(0073,1006)	?	UT	1	Value of the transfer syntax	Study level of a study's composite
(2001,1063)	?	CS	1	Value: ELSEWHERE	Study level of a study's composite
(2007,2512)	?	LO	1	Value: volumeSequenceCapture	Study level of a study's composite

8.3. Coded Terminology and Templates

Not applicable.

8.3.1. Context Groups

Not applicable.

8.3.2. Template Specifications

Not applicable.

8.3.3. Private code definitions

Not applicable.

8.4. Grayscale Image consistency

The high resolution display monitor attached to the product can be calibrated according to the Grayscale Standard Display Function (GSDF). The service/Installation Tool is used together with a luminance meter to measure the Characteristic Curve of the display system and the current ambient light. See the product Service Manual for details on the calibration procedure and supported calibration hardware. The result of the calibration procedure is a Monitor Correction LUT that will be active within the display subsystem after a system reboot.

8.5. Standard Extended/Specialized/Private SOPs

Supported extended, specialized and private SOP classes are:

Table 104: 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
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1

8.5.1. Standard Extended/Specialized/Private SOP Instance

8.5.1.1. Secondary Capture Image Storage SOP Class

Table 105: Addition of standard and private attributes for Secondary Capture Image Storage SOP Class Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Requesting Physician	0032,1032	PN		ANAP	COPY	
Performed Procedure Step End Date	0040,0250	DA		ALWAYS	AUTO	
Performed Procedure Step End Time	0040,0251	TM		ALWAYS	AUTO	
Private Creator Group (0073,0010)	0073,0010	LO	STENTOR	ALWAYS	FIXED	
Stentor Remote IP-Address Element	0073,1002	UT		ALWAYS	CONFIG	
Stentor Remote AETitle Element	0073,1003	UT		ALWAYS	CONFIG	
Stentor Local AETitle Element	0073,1004	UT		ALWAYS	CONFIG	
Private DICOM attribute (0073,1006)	0073,1006	LO		ALWAYS	CONFIG	
Private Creator Group 2001 Examination Source	2001,0010	LO	Philips Imaging DD 001	ALWAYS	COPY	
	2001,1063	CS	ELSEWHERE	ALWAYS	COPY	
Private Creator Group (2007,0025)	2007,0025	LO	Philips EV Imaging DD 022	ALWAYS	AUTO	
Private DICOM Attribute (2007,2512)	2007,2512	LO	volumeSequenceCapture	ALWAYS	AUTO	

8.6. Private Transfer Syntaxes

Not applicable.

9. Annexes of application "image viewing"

9.1. IOD Contents

9.1.1. Created SOP Instance

This section specifies each created IOD by this application.

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

9.1.1.1. List of created SOP Classes

Table 106: List of created SOP Classes

SOP Class Name	SOP Class UID
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7

9.1.1.2. Secondary Capture Image Storage SOP Class

Table 107: IOD of Created Secondary Capture Image Storage SOP Class Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	ALWAYS
Patient	Clinical Trial Subject Module	CONDITIONAL
Study	General Study Module	ALWAYS
Study	Patient Study Module	CONDITIONAL
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

Table 108: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Ethnic Group	0010,2160	SH		ANAPCV	COPY	
Other Patient IDs	0010,1000	LO		ANAPCV	COPY	
Other Patient Names	0010,1001	PN		ANAPCV	COPY	
Patient Comments	0010,4000	LT		ANAPCV	COPY	
Patient ID	0010,0020	LO		ALWAYS	COPY	
Patient's Birth Date	0010,0030	DA		VNAP	COPY	
Patient's Birth Time	0010,0032	TM		ANAPCV	COPY	
Patient's Name	0010,0010	PN		ALWAYS	COPY	
Patient's Sex	0010,0040	CS		VNAP	COPY	
Other Patient IDs Sequence	0010,1002	SQ		ANAP	COPY	
>Patient ID	0010,0020	LO		ALWAYS	COPY	
>Type of Patient ID	0010,0022	CS		ALWAYS	COPY	
>Issuer of Patient ID	0010,0021	LO		ANAPCV	COPY	
Referenced Patient Sequence	0008,1120	SQ		ANAP	COPY	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	COPY	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	COPY	
Issuer of Patient ID	0010,0021	LO		ANAP	COPY	

Table 109: Clinical Trial Subject Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Clinical Trial Protocol ID	0012,0020	LO		ALWAYS	COPY	
Clinical Trial Protocol Name	0012,0021	LO		VNAP	COPY	
Clinical Trial Site ID	0012,0030	LO		VNAP	COPY	
Clinical Trial Site Name	0012,0031	LO		VNAP	COPY	
Clinical Trial Sponsor Name	0012,0010	LO		ALWAYS	COPY	
Clinical Trial Subject ID	0012,0040	LO		ANAP	COPY	
Clinical Trial Subject Reading ID	0012,0042	LO		ANAP	COPY	

Table 110: General Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Accession Number	0008,0050	SH		VNAP	COPY	
Name of Physician(s) Reading Study	0008,1060	PN		ANAPCV	COPY	
Physician(s) of Record	0008,1048	PN		ANAPCV	COPY	
Referring Physician's Name	0008,0090	PN		VNAP	COPY	
Study Date	0008,0020	DA		VNAP	COPY	
Study Description	0008,1030	LO		ALWAYS	USER	
Study ID	0020,0010	SH		VNAP	COPY	
Study Instance UID	0020,000D	UI		ALWAYS	COPY	
Study Time	0008,0030	TM		VNAP	COPY	
Procedure Code Sequence	0008,1032	SQ		ANAPCV	COPY	
>Code Meaning	0008,0104	LO		ALWAYS	COPY	
>Code Value	0008,0100	SH		ALWAYS	COPY	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	COPY	
>Coding Scheme Version	0008,0103	SH		ANAP	COPY	
>Context Group Extension Creator UID	0008,010D	UI		ANAP	COPY	
>Context Group Extension Flag	0008,010B	CS		ANAPCV	COPY	
>Context Group Local Version	0008,0107	DT		ANAP	COPY	
>Context Group Version	0008,0106	DT		ANAP	COPY	
>Context Identifier	0008,010F	CS		ANAPCV	COPY	
>Mapping Resource	0008,0105	CS		ANAP	COPY	
Referenced Study Sequence	0008,1110	SQ		ANAPCV	COPY	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	COPY	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	COPY	

Table 111: Patient Study Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Additional Patient History	0010,21B0	LT		ANAPCV	COPY	
Admitting Diagnoses Description	0008,1080	LO		ANAPCV	COPY	
Occupation	0010,2180	SH		ANAPCV	COPY	
Patient's Age	0010,1010	AS		ANAPCV	COPY	
Patient's Size	0010,1020	DS		ANAPCV	COPY	
Patient's Weight	0010,1030	DS		ANAPCV	COPY	

Table 112: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Laterality	0020,0060	CS		ANAPCV	COPY	

Performing Physician's Name	0008,1050	PN		ANAPCV	COPY	
Protocol Name	0018,1030	LO		ANAPCV	USER	
Series Date	0008,0021	DA		ANAPCV	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		VNAP	AUTO	
Series Time	0008,0031	TM		ANAPCV	AUTO	
Referenced Performed Procedure Step Sequence	0008,1111	SQ		ANAPCV	COPY	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS	COPY	
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS	COPY	
Request Attributes Sequence	0040,0275	SQ		ANAPCV	COPY	
>Requested Procedure ID	0040,1001	SH		ANAP	COPY	
Comments on the Performed Procedure Step	0040,0280	ST		ANAPCV	COPY	
Performed Procedure Step Description	0040,0254	LO		ANAPCV	COPY	
Performed Procedure Step ID	0040,0253	SH		ANAPCV	COPY	
Performed Procedure Step Start Date	0040,0244	DA		ANAPCV	COPY	
Performed Procedure Step Start Time	0040,0245	TM		ANAPCV	AUTO	Copied and time change to hhmss
Performed Protocol Code Sequence	0040,0260	SQ		ANAPCV	COPY	
>Code Meaning	0008,0104	LO		ALWAYS	COPY	
>Code Value	0008,0100	SH		ALWAYS	COPY	
>Coding Scheme Designator	0008,0102	SH		ALWAYS	COPY	
>Coding Scheme Version	0008,0103	SH		ANAP	COPY	

Table 113: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Institution Name	0008,0080	LO		ALWAYS	CONFIG	
Manufacturer	0008,0070	LO	Philips Medical Systems	ALWAYS	AUTO	
Manufacturer's Model Name	0008,1090	LO	ViewForum	ANAPCV	CONFIG	
Software Version(s)	0018,1020	LO	Value 1: ViewForum 8.3	ANAPCV	CONFIG	

Table 114: SC Equipment Module

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

Table 115: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Content Date	0008,0023	DA		ANAPCV	AUTO	
Content Time	0008,0033	TM		ANAPCV	AUTO	
Image Type	0008,0008	CS	Value 1: DERIVED, Value 2: SECONDARY	ANAPCV	AUTO	
Instance Number	0020,0013	IS		VNAP	AUTO	

Patient Orientation	0020,0020	CS		EMPTY	AUTO	
---------------------	-----------	----	--	-------	------	--

Table 116: Image Pixel Module

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

Table 117: 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	ALWAYS	AUTO	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	
Specific Character Set	0008,0005	CS		ANAP	AUTO	

9.1.2. Usage of Attributes from Received IOD

Table 118: Functionalities

Functionality	Type1	Optional	Private
image viewing	X	X	X

9.1.2.1. Usage of the Functionality image viewing

The following table lists the supported SOP Classes which can be used by this application.

Table 119: Supported SOP Classes for functionality image viewing

SOP Class name	SOP Class UID
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1

9.1.3. Attribute Mapping

Not applicable.

9.1.4. Coerced/Modified fields

Not applicable.

9.2. Data Dictionary of Private Attributes

Not applicable.

9.3. Coded Terminology and Templates

Not applicable.

9.3.1. Context Groups

Not applicable.

9.3.2. Template Specifications

Not applicable.

9.3.3. Private code definitions

Not applicable.

9.4. 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.

9.5. Standard Extended/Specialized/Private SOPs

Supported extended, specialized and private SOP classes are:

Table 120: List of created SOP Classes

SOP Class Name	SOP Class UID
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7

9.5.1. Standard Extended/Specialized/Private SOP Instance

9.5.1.1. Secondary Capture Image Storage SOP Class

Table 121: Addition of standard and private attributes for Secondary Capture Image Storage SOP Class Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Medical Alerts	0010,2000	LO		ANAP	COPY	

Allergies	0010,2110	LO		ANAP	COPY	
Requesting Physician	0032,1032	PN		ANAP	COPY	
Performed Procedure Step End Date	0040,0250	DA		ALWAYS	AUTO	
Performed Procedure Step End Time	0040,0251	TM		ALWAYS	AUTO	
Private Creator Group (0073,0010)	0073,0010	LO	STENTOR	ALWAYS	AUTO	
Stentor Remote IP-Address Element	0073,1002	UT		ALWAYS	AUTO	
Stentor Remote AETitle Element	0073,1003	UT		ALWAYS	AUTO	
Stentor Local AETitle Element	0073,1004	UT		ALWAYS	AUTO	
Private DICOM attribute (0073,1006)	0073,1006	LO		ALWAYS	AUTO	
Private Creator Group 2001	2001,0010	LO	Philips Imaging DD 001	ALWAYS	AUTO	
Examination Source	2001,1063	CS	ELSEWHERE	ALWAYS	AUTO	
Private Creator Group (2007,0025)	2007,0025	LO	Philips EV Imaging DD 022	ALWAYS	AUTO	
Private DICOM Attribute (2007,2512)	2007,2512	LO	volumeSequenceCapture	ALWAYS	AUTO	

9.6. Private Transfer Syntaxes

Not applicable.