
DICOM

Conformance Statement

Xcelera R3.1L1



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1. DICOM CONFORMANCE STATEMENT OVERVIEW

Xcelera is the Philips Cardiology multi-modality image and information management solution that allows images, information and reports to be reviewed, stored and distributed throughout the cardiology department and beyond. Xcelera is intended to: a) Review the high quality medical study data provided by modalities, and b) Serve as a permanent archive for such data. As such, the Xcelera system consists of a central image and database server and several connected viewer workspots capable of running various viewer applications (also called review station). The Xcelera is designed with the concerns for the system as: data integrity, performance, image quality, serviceability, and large number of users. Added with easy of use, privacy/confidentiality, flexibility and expandability. Data is imported from the image acquisition system through a vendor provided DICOM port. This port is provided as a safe and reliable way to access the clinical data. In addition to DICOM, Xcelera also maintains compatibility with the installed base of Philips Sonos US image acquisition system in supporting the proprietary DSR-TIFF format. The system also offers DICOM ports such that external systems (viewers, other PACS systems and etc) can access the data. Data can also be imported from and exported to CD or DVD. The primary point of user contact with the system is the viewer workspot, consisting of several clinical tools, e.g. for Cath, Echo, CT and MR, including 3-rd party tools like QLAB. These programs use the common Windows GUI metaphors for selecting items or entering information in the common patient and study search window. A network based on standard technology, connects the Xcelera server, the viewer workspots and external DICOM nodes, such as Cath labs, Ultrasound labs, EP labs and other acquisition systems, DICOM archives, DICOM viewers etc.

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 Annotation Box SOP Class	1.2.840.10008.5.1.1.15	Yes	No
Print Job SOP Class	1.2.840.10008.5.1.1.14	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
Query/Retrieve			
Patient Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	No	Yes
Patient Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	No	Yes
PatientStudy Only QR Info. Model - FIND SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.1	No	Yes
PatientStudy Only QR Info. Model - MOVE SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.2	No	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
Transfer			
3D Object new Storage (Private)	1.3.46.670589.5.0.2.1	Yes	Yes
3D Subpage Store (Private)	1.3.46.670589.2.5.1.1	Yes	Yes

SOP Class		User of Service (SCU)	Provider of Service (SCP)
Name	UID		
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1	Yes	Yes
Basic Text SR SOP Class	1.2.840.10008.5.1.4.1.1.88.11	Yes	Yes
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	Yes	Yes
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33	Yes	Yes
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	Yes	Yes
CX Synthetic Image Storage (Private)	1.3.46.670589.5.0.12	Yes	Yes
Digital Mammography X-Ray Image Storage - Pres. SOP	1.2.840.10008.5.1.4.1.1.1.2	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	Yes
Enhanced SR SOP Class	1.2.840.10008.5.1.4.1.1.88.22	Yes	Yes
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	Yes
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	Yes	Yes
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
MR Synthetic Image Storage (Private)	1.3.46.670589.5.0.10	Yes	Yes
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Yes	Yes
Perfusion (Private)	1.3.46.670589.5.0.13	Yes	Yes
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	Yes	Yes
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	Yes	Yes
RT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.481.1	Yes	Yes
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Specialized PMS X-Ray Image Store (Private)	1.3.46.670589.2.3.1.1	Yes	Yes
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	Yes	Yes
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	Yes
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	Yes
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	Yes	Yes
X-Ray Angiographic Bi-Plane Image Storage SOP Class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	Yes
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes
Workflow Management			
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	Yes

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

A table of Supported Media Storage Application Profiles (with roles) is provided.

Table 2: Media Services

Media Storage Application Profile	File-set Creator (FSC)	File-set Updater (FSU)	File-set Reader (FSR)	Display Directory (DD)
Compact Disk-Recordable				
1024 X-Ray Angiographic Studies on CD-R	Yes	Yes	Yes	No
Basic Cardiac X-RAY Angiographic Studies on CD-R	Yes	Yes	Yes	No
CT/MR Studies on CD-R	Yes	Yes	Yes	No
General Purpose CD-R Interchange	Yes	Yes	Yes	No
Image Display (Ultrasound {SF MF})	Yes	Yes	Yes	No
DVD				
CT/MR Studies on DVD Media	Yes	No	Yes	No
General Purpose DVD Interchange with JPEG	Yes	No	Yes	No
Magneto-Optical Disk				
CT/MR Studies on 1.2GB MOD	No	No	Yes	No
CT/MR Studies on 2.3GB MOD	No	No	Yes	No
CT/MR Studies on 4.1GB MOD	No	No	Yes	No
CT/MR Studies on 650MB MOD	No	No	Yes	No
Image Display (Ultrasound {SF MF}) on 1.2GB 130mm MOD	No	No	Yes	No
Image Display (Ultrasound {SF MF}) on 128MB MOD	No	No	Yes	No
Image Display (Ultrasound {SF MF}) on 2.3GB 130mm MOD	No	No	Yes	No
Image Display (Ultrasound {SF MF}) on 230MB 90mm MOD	No	No	Yes	No
Image Display (Ultrasound {SF MF}) on 540MB 90mm MOD	No	No	Yes	No
Image Display (Ultrasound {SF MF}) on 650MB 130mmMOD	No	No	Yes	No

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3. INTRODUCTION

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

3.1. Revision History

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

Table 3: Revision History

Document Version	Date of Issue	Status	Description
00	26-May-2009	Approved	Final version
01	24-February-2010	Approved	Updated the transfer syntax from Process 14 NH to Process 14 NH-FOP
02	17-June-2010	Approved	Updated Transfer Syntax Conversion Table

3.2. Audience

This Conformance Statement is intended for:

- (Potential) customers
- System integrators of medical equipment
- Marketing staff interested in system functionality
- Software designers implementing DICOM interfaces

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

3.3. Remarks

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

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

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

implementation of the DICOM interface corresponds with this Conformance Statement.

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

- **New versions of the DICOM Standard**

The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery.

The user should ensure that any non-Philips provider linking to Philips equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

3.4. Definitions, Terms and Abbreviations

Table 4: Definitions, Terms and Abbreviations

Abbreviation/Term	Explanation
AE	Application Entity
ANSI	American National Standard Institute
AP	Application Profile
BOT	Basic Offset Table
CD	Compact Disc
CD-R	CD-Recordable
CD-M	CD-Medical
CR	Computed Radiography
CT	Computed Tomography
DCR	Dynamic Cardio Review
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DIMSE-Composite
DIMSE-N	DIMSE-Normalized
DX	Digital X-Ray
EBE	DICOM Explicit VR Big Endian
ELE	DICOM Explicit VR Little Endian
FSC	File-set Creator
FSR	File-set Reader
FSU	File-set Updater
GUI	Graphic User Interface
HIS	Hospital Information System
HL7	Health Level Seven
ILE	DICOM Implicit VR Little Endian
IOD	Information Object Definition

Abbreviation/Term	Explanation
ISIS	Information System - Imaging System
MOD	Magneto-Optical Disk
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance
NEMA	National Electrical Manufacturers Association
NM	Nuclear Medicine
PDU	Protocol Data Unit
RF	X-Ray Radiofluoroscopic
RIS	Radiology Information System
RT	Radiotherapy
RWA	Real-World Activity
SC	Secondary Capture
SCM	Study Component Management
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier
US	Ultrasound
USMF	Ultrasound Multi-frame
WLM	Worklist Management
XA	X-Ray Angiographic

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 2008) 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

As part of the implementation model, an application data flow diagram is included. This diagram represents all of the Application Entities present in an implementation, and graphically depicts the relationship of the AE's use of DICOM to Real-World Activities as well as any applicable user interaction.

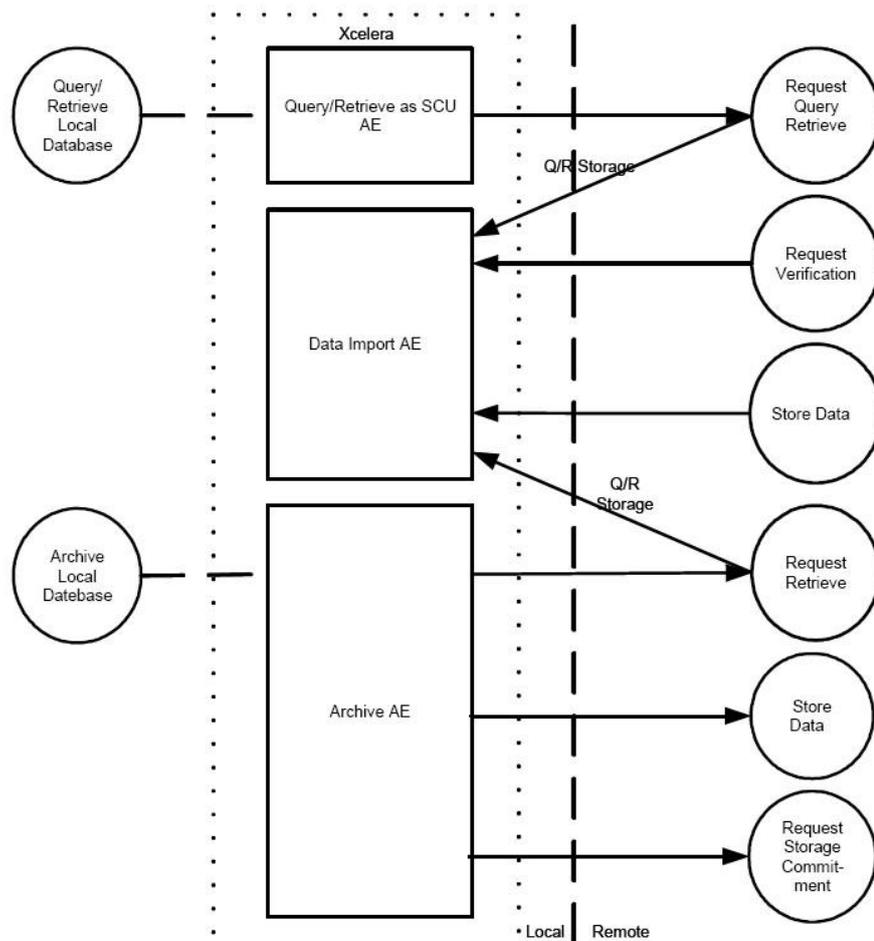


Figure 1: Application Data Flow Diagram (1)

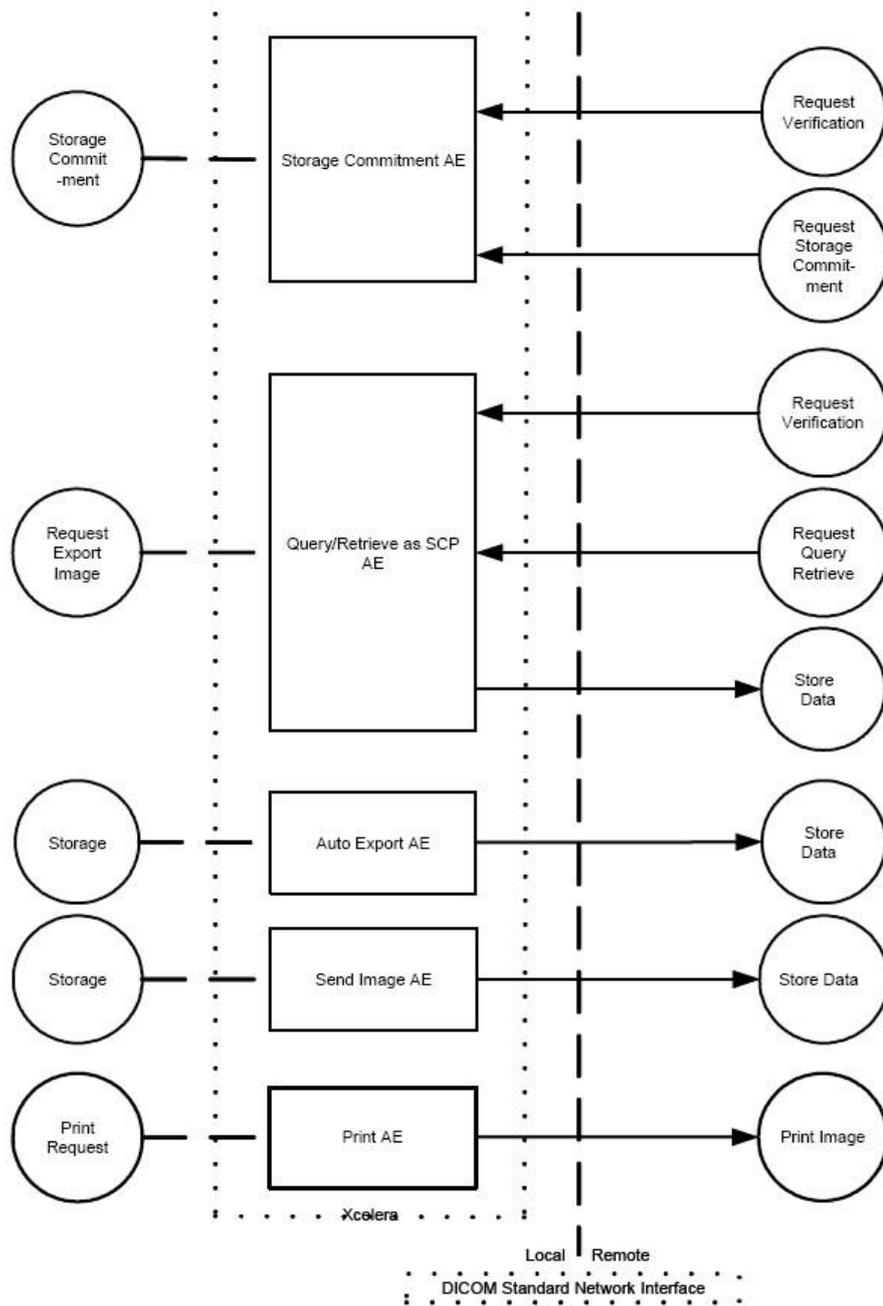


Figure 2: Application Data Flow Diagram (2)

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 Archive AE

The Archive AE handles the communication between Xcelera and the DICOM Archive. For storing images to an archive, an automatic function, Storage with Storage Commitment will be used. To pull the image from an archive, a C-MOVE with Study Instance UID handles this action. The study/image will be retrieved via the Import AE.

4.1.2.2. Functional Definition of Auto Export AE

On event, Xcelera (SCU) automatically initiates an association with a remote DICOM AE (SCP) to send a storage request and the applicable image data. (DICOM Storage Service Class)

4.1.2.3. Functional Definition of Image Import AE

Xcelera (SCP) accepts an association with a remote DICOM AE (SCU) to receive a storage request and the applicable image data. (DICOM Storage Service Class)

4.1.2.4. Functional Definition of Print AE

The Print AE in Xcelera supports the functionality for basic grayscale print management, basic annotation box, and print job. On demand, Xcelera (SCU) initiates an association with a printer (SCP) and sends a create requests to the printer(DICOM Print Management SOP class).

4.1.2.5. Functional Definition of Query Retrieve as SCP AE

Xcelera Query/Retrieve as SCP AE consists of two functions. Xcelera (SCP) accepts an association from a remote DICOM AE (SCU) to receive a Query/Retrieve request. (DICOM Query/Retrieve Service Class). - When a retrieve of an image is requested, Xcelera sends that requested image through Store SCU AE (DICOM Storage Service Class)

4.1.2.6. Functional Definition of Query Retrieve as SCU AE

Xcelera (SCU) initiates an association with a remote DICOM AE (SCP) to send a Query/Retrieve request. (DICOM Storage Service Class).

4.1.2.7. Functional Definition of Send AE

When the Send function in Xcelera is addressed, Xcelera (SCU) initiates an association with a remote DICOM AE (SCP) to send a storage request and the applicable image data. (DICOM Storage Service Class)

4.1.2.8. Functional Definition of Storage Commitment AE

Xcelera (SCP) accepts an association from a remote DICOM AE (SCU) to receive a storage commitment request. After handling the requested storage commitment, Xcelera initiates an association with the SCU to report the status of the storage commitment (DICOM Storage Commitment Service Class)

4.1.3. Sequencing of Real World Activities

All Real-World Activities as specified in the Functional Definition of Application Entities may occur independently from each other.

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. Archive AE

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

4.2.1.1. SOP Classes

Archive AE is used for archiving the patient studies either in Xcelera Server (Xcelera DICOM Archive) or in external DICOM Archive.

Archive AE is intended to do the functioning of storing the patient studies in the DICOM Archive, Sending the Storage Commitment to the DICOM Archive and Retrieving studies from the DICOM Archive whenever they are needed. These functions are undertaken automatically.

Archive AE, for its functioning, makes use of following DICOM functions

- Verification as SCU, which uses C-ECHO service element
- Image Storage as SCU, which uses C-STORE as service element
- Storage Commitment as SCU, which uses N-ACTION, N-EVENT-REPORT service elements
- Retrieve as SCU, which uses C-MOVE as service element
- Depending on the configuration, patient study will be updated with the latest information in the DICOM Archive. (Refer to the tables in section 4.2.1.3.3.3 for the list of updated patient and study attributes.)

The separate AEs need to be configured for Storage, Storage Commitment and Fetch (Retrieve) functionalities.

These DICOM functions will be described in the subsections that follow.

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

Table 5: SOP Classes for Archive AE

SOP Class Name	SOP Class UID	SCU	SCP
3D Object new Storage (Private)	1.3.46.670589.5.0.2.1	Yes	No
3D Subpage Store (Private)	1.3.46.670589.2.5.1.1	Yes	No
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1	Yes	No
Basic Text SR SOP Class	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	Yes	No
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33	Yes	No
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Yes	No
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Yes	No
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	Yes	No
CX Synthetic Image Storage (Private)	1.3.46.670589.5.0.12	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Enhanced SR SOP Class	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	No
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	Yes	No
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	Yes	No

SOP Class Name	SOP Class UID	SCU	SCP
MR Synthetic Image Storage (Private)	1.3.46.670589.5.0.10	Yes	No
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Yes	No
Perfusion (Private)	1.3.46.670589.5.0.13	Yes	No
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	Yes	No
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	Yes	No
RT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.481.1	Yes	No
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	No
Specialized PMS X-Ray Image Store (Private)	1.3.46.670589.2.3.1.1	Yes	No
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Yes	No
Study Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Yes	No
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	Yes	No
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	No
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	No
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
Verification SOP Class	1.2.840.10008.1.1	Yes	No
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	Yes	No
X-Ray Angiographic Bi-Plane Image Storage SOP Class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	No
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	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 6: 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 7: Number of associations as an Association Initiator for this AE

Description	Value
Maximum number of simultaneous associations	1

4.2.1.2.3. Asynchronous Nature

The implementation supports negotiation of multiple outstanding transactions, along with the maximum number of outstanding transactions supported.

Table 8: Asynchronous nature as an Association Initiator for this AE

Description	Value
Maximum number of outstanding asynchronous transactions	Unlimited

4.2.1.2.4. Implementation Identifying Information

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

Table 9: DICOM Implementation Class and Version for Archive AE

Implementation Class UID	1.3.46.670589.16.14.3.1.1
Implementation Version Name	Xcelera R3.1.L1

4.2.1.2.5. Communication Failure Handling

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

Table 10: Communication Failure Behavior

Exception	Behavior
ARTIM Timeout	The association is closed and the reason is logged.

4.2.1.3. Association Initiation Policy

The Application Entity will respond on a received reject Association attempt as shown in next table.

Table 11: Association Rejection response

Result	Source	Reason/Diagnosis	Explanation
1 - rejected-permanent	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - applicaton-context-name-not supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
2 - protocol-version-not-supported		The user is informed. Details are logged in central log file.	

Result	Source	Reason/Diagnosis	Explanation
	3 - DICOM UL service-provider(Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.
		2 - local-limit-exceeded	The user is informed. Details are logged in central log file.
2 - rejected-transient	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - application-context-name-not-supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - protocol-version-not-supported	The user is informed. Details are logged in central log file.
	3 - DICOM UL service-provider (Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.
		2 - local-limit-exceeded	The user is informed. Details are logged in central log file.

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

Table 12: 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	When received, terminates the connection and logs the event.
	1 - unrecognized-PDU	When received, terminates the connection and logs the event.
	2 - unexpected-PDU	When received, terminates the connection and logs the event.
	4 - unrecognized-PDU-parameter	When received, terminates the connection and logs the event.
	5 - unexpected-PDU-parameter	When received, terminates the connection and logs the event.
	6 - invalid-PDU-parameter-value	When received, terminates the connection and logs the event.

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

4.2.1.3.1.1. Description and Sequencing of Activities

The Archive AE sends associations to systems to verify application level communication using the C-ECHO command.

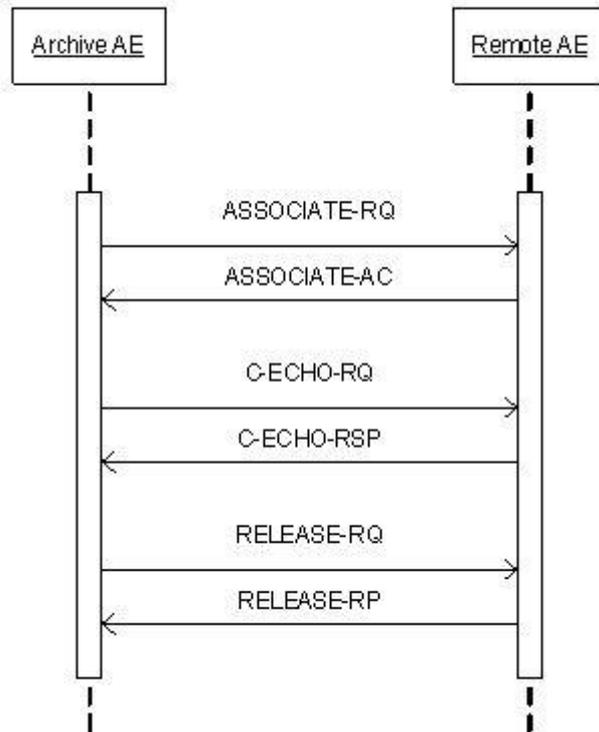


Figure 3: (Real World) Activity - Verification as SCU

4.2.1.3.1.2. Proposed Presentation Contexts

The Archive AE proposes the following presentation contexts to the remote AE during the association request before sending the C-ECHO.

Table 13: 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

The Archive AE provides standard conformance to Verification SOP Class.

4.2.1.3.1.3.1. Dataset Specific Conformance for Verification C-ECHO 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 14: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Confirmation	Message in log file.

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

4.2.1.3.2.1. Description and Sequencing of Activities

Steps in fetch from DICOM Archive:

1. Sends a DICOM C-MOVE (using Study UID from the database as identifier) request to the DICOM archive for each study to be fetched.
2. In response to the C-MOVE, DICOM Archive performs a C-STORE to Xcelera data Import AE.

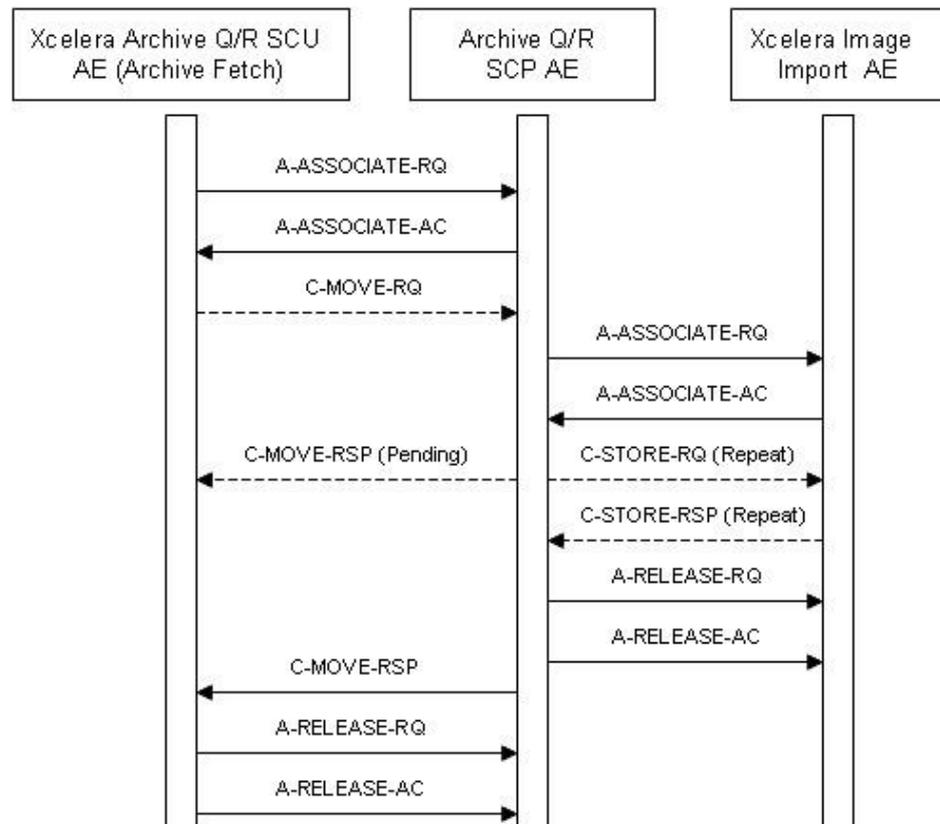


Figure 4: (Real World) Activity - MOVE As SCU (Archive Fetch)

4.2.1.3.2.2. Proposed Presentation Contexts

The presentation contexts proposed by Archive QR SCU AE for (Real-World) Activity – C-MOVE are defined in next table.

Table 15: 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		
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		

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

Only Study level queries are supported.

The Archive QR SCU AE supports queries based on the combination of the following (Study level) attributes and attribute matching types (as defined in [DICOM] PS 3.4).

Exceptions:

1. If after setting up the connection and sending the move request, if no data is received from the external DICOM node before a (user configurable) time out has passed, the QR SCU AE aborts the connection.
2. If an error occurs on the external DICOM node while setting up the connection, the QR SCU AE will abort all actions related to the connection and report errors.
3. If no agreement between the two parties can be reached concerning communication parameters the connection will be closed and no query communications will take place.
4. If an error occurs on the DICOM Archive server during query communications, the DICOM Archive server will abort the connection.

4.2.1.3.2.3.1. 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 16: Identifiers for MOVE Study Root Information Model as SCU

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	Universal Matching.

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	Sub-operations complete – No failures	The Retrieve job is marked as Completed at the queue manager. The association is released.
Failed	A900	Identifier does not match SOP class	The Retrieve job is marked as Failed at the queue manager. The association is released. The reason is logged.
	Cxxx	Unable to process	The Retrieve job is marked as Failed at the queue manager. The association is released. The reason is logged.
Refused	A701	Out of resources – Unable to calculate number of matches	The Retrieve job is marked as Failed at the queue manager. The association is released. The reason is logged.
	A702	Out of resources – Unable to perform sub-operations	The Retrieve job is marked as Failed at the queue manager. The association is released. The reason is logged.
	A801	Destination unknown	The Retrieve job is marked as Failed at the queue manager. The association is released. The reason is logged.
Pending	FF00	Sub-operations are continuing	The Retrieve job continues.
Warning	B000	Sub-operations complete – One or more failures	The Retrieve job is marked as Completed at the queue manager. The association is released. The reason is logged.
Cancel	FE00	Sub-operations terminated due to Cancel indication	The Retrieve job is marked as Failed at the queue manager. The association is released. The reason is logged.

Table 18: DICOM Command Communication Failure Behavior

Exception	Behavior
Reply Time-out	The job fails and the association is aborted. The reason is logged and reported to the user.
Association Time-out SCU	N/A
Association Aborted	The job fails. The reason is logged and reported to the user.

4.2.1.3.3. (Real-World) Activity – Image Export

4.2.1.3.3.1. Description and Sequencing of Activities

Normal flow of events:

1. When the condition for Archiving of a study/studies are met (based on the Archive Configuration settings), Xcelera sets up a store connection and negotiates communication parameters with this Archive DICOM node. Connection setup is executed according to DICOM Store protocols, with Xcelera acting as DICOM Store SCU.
2. After this connection is setup, Xcelera send study/studies to the external DICOM node. Upon completion of this, the connection is closed. Start and end of the connection and data transfer are logged.

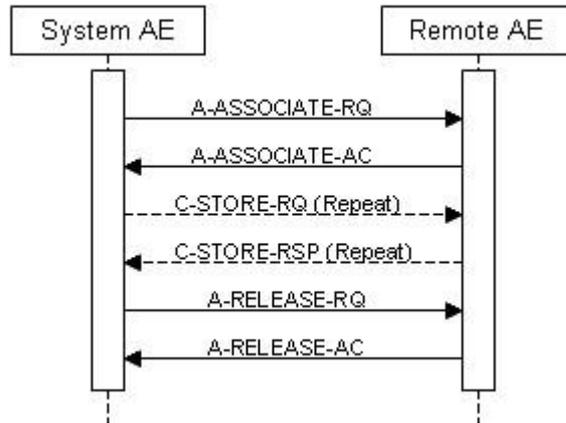


Figure 5: (Real World) Activity – Image Export (Archive Storage SCU)

4.2.1.3.3.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 19: 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 Object new Storage (Private)	1.3.46.670589.5.0.2.1	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		
3D Subpage Store (Private)	1.3.46.670589.2.5.1.1	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		
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		
Basic Text SR SOP Class	1.2.840.10008.5.1.4.1.1.88.11	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		
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	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		
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33	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		
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	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		
CX Synthetic Image	1.3.46.670589.5.0.12	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage (Private)		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	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		
Enhanced SR SOP Class	1.2.840.10008.5.1.4.1.1.88.22	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		
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	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	1.2.840.10008.5.1.4.1.1.11.1	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		
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	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		
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	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
MR Synthetic Image Storage (Private)	1.3.46.670589.5.0.10	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		
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Perfusion (Private)	1.3.46.670589.5.0.13	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		
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	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		
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
RT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.481.1	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		
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Specialized PMS X-Ray Image Store (Private)	1.3.46.670589.2.3.1.1	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		
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	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		
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Angiographic Bi-Plane Image Storage SOP Class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70	SCU	None
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		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		
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	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		

4.2.1.3.3.3. SOP Specific Conformance for Storage SOP Classes

The Archive AE conforms to the SOP classes of the Storage Service Class at level 2 (full). No data elements are discarded or coerced by the Archive AE.

The list of updated patient and study attributes are mentioned in the tables below.

Table 20: List of updated Patient Attributes

Attribute	DICOM Tag
Last Name	Part of (0010,0010)
First name	Part of (0010,0010)
Middle name	Part of (0010,0010)
Date of birth	(0010,0030)
Sex	(0010,0040)
Institution	(0010,0021)
MRN	(0010,0020)
Alternate ID#	(0010,1000)
Title	Part of (0010,0010)
Honorific	Part of (0010,0010)
Address 1	Part of (0010,1040)
Address 2 (if Address1 is empty)	Part of (0010,1040)
City	Part of (0010,1040)
State/Province	(0010,2152)
Postal code	Part of (0010,1040)
Country	(0010,2150)
Race	(0010,2160)
Home phone	Part of (0010,2154)
Business phone	Part of (0010,2154)
Mobile phone	Part of (0010,2154)

Table 21: List of updated Study Attributes

Attribute	DICOM Tag
Study Type	(0008,1030)
Accession Number	(0008,0050)
Body Part	(0018,0015)
Protocol Name	(0018,1030)
Reason for Study	(0008,1080)
Performed By	(0008,1050)
Reading Physician	(0008,1060)
Ordering Physician	(0032,1032)
Reviewer	(300E,0008)
Referring Physician	(0008,0090)

4.2.1.3.3.3.1. 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 22: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful stored	
Refused	A700	Data set does not match SOP class	Log.
Warning	B000	Coercion of data elements	Log; Continue.
	B006	Elements discarded	Log; Continue.
	B007	Data set does not match SOP class	Log; Continue.
Error	0110	Error – Processing failure	Log.
	A900	Error – Data set does not match SOP class	Log.
	C000	Error – Cannot understand	Log.

Exceptions:

1. If, after setting up the connection, no data can be sent to the external DICOM node for 2 minutes, Xcelera will retry once and then it will abort the connection.
2. If an error occurs on Xcelera while setting up the connection, Xcelera aborts and reports error.
3. If an error occurs on the external DICOM node while setting up the connection, Xcelera will abort all actions related to that connection and report errors.
4. If no agreement between the two parties can be reached concerning communication parameters the connection will be closed and no data transfer will take place.
5. When a network error occurs during connection set up or during data transfer, Xcelera will abort all actions related to the connection.
6. If an error occurs on Xcelera during data transfer, Xcelera will notify the external DICOM node of this problem and after that close the connection.

Table 23: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is closed and the reason logged
Association aborted	The association is closed and the reason logged

4.2.1.3.4. (Real-World) Activity – Storage Commitment Push Model AS SCU**4.2.1.3.4.1. Description and Sequencing of Activities****Normal Flow of events:**

1. After the configured time, Xcelera will initiate a Storage Commit request for the study that it stored into the DICOM Archive.
2. When a successful response from the DICOM archive is received, for this study, Xcelera mark this study as correctly archived.

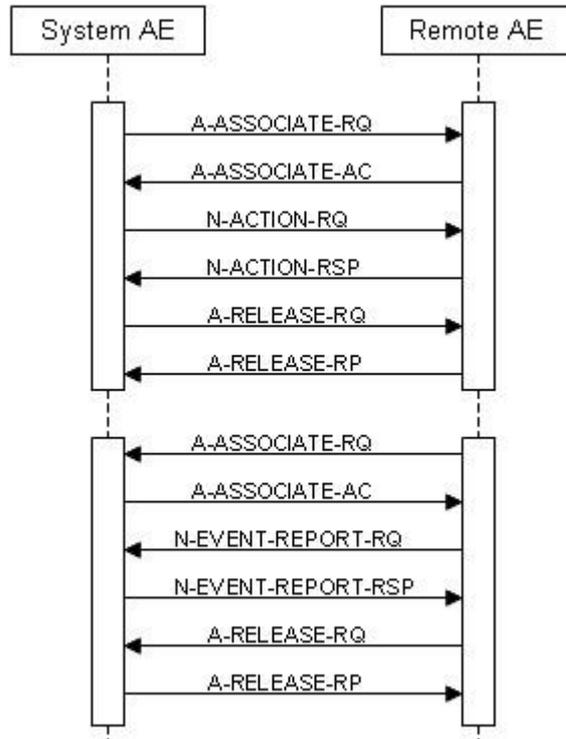


Figure 6: (Real World) Activity - Storage Commitment Push Model AS SCU

4.2.1.3.4.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 24: Proposed Presentation Contexts for (Real-World) Activity – Storage Commitment Push Model AS SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

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

The Archive AE (Storage Commitment) provides standard conformance to the Storage Commitment Push Model SOP Class.

4.2.1.3.4.3.1. Dataset Specific Conformance for Storage Commitment Push Model SOP Class N-EVENT-REPORT-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 25: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Confirmation	The association will be released. The reason is logged.
Failure	xxxx	(any failure)	The reason is logged.

Table 26: DICOM Command Communication Failure Behavior

Exception	Behavior
Reply Time-out	The association is released.
Association Time-out SCU	The association is released.
Association Aborted	The association is released.

4.2.1.3.4.3.2. Dataset Specific Conformance for Storage Commitment Push Model SOP Class N-ACTION-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 27: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Confirmation	The association will be released. The reason is logged.
Failure	xxxx	(any failure)	The reason is logged.

Table 28: DICOM Command Communication Failure Behavior

Exception	Behavior
Reply Time-out	The association is released.
Association Time-out SCU	The association is released.
Association Aborted	The association is released.

Exceptions:

1. After setting up the connection, if no data can be sent to the external node for 60 seconds, Xcelera aborts the connection and reports an error.
2. An error occurs on the target node while setting up the connection. If the retries are unsuccessful, the system will mark the data for later archiving.
3. If an error or warning concerning data transfer is received from the target node during data transfer. If it is related to the data being send Xcelera tries to correct the cause of the error
4. When Xcelera can not setup connection with the DICOM Archive, Xcelera will retry

for 3 times. If within these retries, if it is still not possible to setup the connection, the study will be re-archived, conforms its own retry mechanism and a warning will be reported.

5. When Xcelera does not receive a storage commit report within 72 hours, the study will be re-archived, conforms its own retry mechanism and a warning will be reported.

6. When the Xcelera receives a storage commit response other than successful, the study will be re-archived, conforms to its own retry mechanism and a warning will be reported.

4.2.1.4. Association Acceptance Policy

Not applicable, Archive AE does not accept associations.

4.2.2. Auto Export 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 Auto Export AE

SOP Class Name	SOP Class UID	SCU	SCP
3D Object new Storage (Private)	1.3.46.670589.5.0.2.1	Yes	No
3D Subpage Store (Private)	1.3.46.670589.2.5.1.1	Yes	No
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1	Yes	No
Basic Text SR SOP Class	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	Yes	No
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33	Yes	No
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Yes	No
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	Yes	No
CX Synthetic Image Storage (Private)	1.3.46.670589.5.0.12	Yes	No
Digital Mammography X-Ray Image Storage - Pres. SOP	1.2.840.10008.5.1.4.1.1.1.2	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Enhanced SR SOP Class	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	No
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	Yes	No
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	Yes	No
MR Synthetic Image Storage (Private)	1.3.46.670589.5.0.10	Yes	No
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Yes	No
Perfusion (Private)	1.3.46.670589.5.0.13	Yes	No
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	Yes	No
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	Yes	No
RT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.481.1	Yes	No
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	No
Specialized PMS X-Ray Image Store (Private)	1.3.46.670589.2.3.1.1	Yes	No
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	Yes	No
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	No
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	No
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	Yes	No
X-Ray Angiographic Bi-Plane Image Storage SOP Class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	No
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	Yes	No

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	Limited by system resource.

4.2.2.2.3. Asynchronous Nature

The implementation supports negotiation of multiple outstanding transactions, along with the maximum number of outstanding transactions supported.

Table 32: Asynchronous nature as an Association Initiator for this AE

Description	Value
Maximum number of outstanding asynchronous transactions	Not applicable

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 Auto Export AE

Implementation Class UID	1.3.46.670589.16.14.3.1.1
Implementation Version Name	Xcelera R3.1.L1

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
ARTIM Timeout	The association closed and the reason is logged.

4.2.2.3. Association Initiation Policy

The Application Entity will respond on a received reject Association attempt as shown in next table.

Table 35: Association Rejection response

Result	Source	Reason/Diagnosis	Explanation
1 - rejected-permanent	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - applicaton-context-name-not supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - protocol-version-not-supported	The user is informed. Details are logged in central log file.
	3 - DICOM UL service-provider (Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.
2 - local-limit-exceeded		The user is informed. Details are logged in central log file.	
2 - rejected-transient	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - application-context-name-not-supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - protocol-version-not-supported	The user is informed. Details are logged in central log file.
	3 - DICOM UL service-provider (Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.
2 - local-limit-exceeded		The user is informed. Details are logged in central log file.	

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

4.2.2.3.1. (Real-World) Activity – Image Export

4.2.2.3.1.1. Description and Sequencing of Activities

Normal flow of events:

1. Xcelera sets up a connection with the target DICOM node and negotiates communications parameters. If the two parties cannot agree on transfer using the data format stored on the server, Xcelera will negotiate an alternative DICOM transfer syntax and create a converted copy of the study data to be transferred.
2. Then Xcelera transfers data (complete study or SC only) to the target DICOM node. Depending on configuration setting, Xcelera auto forwards studies completely, or only new deltas such as photo files or new images coming from an acquisition system.
3. Upon completion of this transfer, the connection is closed. Connection set up and connection release, and data transfer takes place according to the DICOM Store protocol defined as part of the DICOM 3.0 standard.

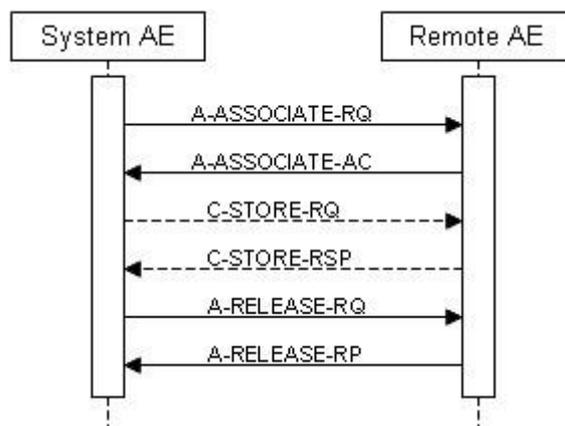


Figure 7: (Real World) Activity - Image Export (Data Export)

4.2.2.3.1.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

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

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
3D Object new Storage (Private)	1.3.46.670589.5.0.2.1	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		
3D Subpage Store (Private)	1.3.46.670589.2.5.1.1	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		
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		
Basic Text SR SOP Class	1.2.840.10008.5.1.4.1.1.88.11	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		
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	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		
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33	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		
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	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		
CX Synthetic Image Storage (Private)	1.3.46.670589.5.0.12	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		
Digital Mammography X-Ray Image Storage - Pres. SOP	1.2.840.10008.5.1.4.1.1.1.2	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		
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	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		
Enhanced SR SOP Class	1.2.840.10008.5.1.4.1.1.88.22	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		
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	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	1.2.840.10008.5.1.4.1.1.11.1	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		
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	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		
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	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
MR Synthetic Image	1.3.46.670589.5.0.10	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage (Private)		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Perfusion (Private)	1.3.46.670589.5.0.13	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		
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	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		
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
RT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.481.1	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		
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		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Specialized PMS X-Ray Image Store (Private)	1.3.46.670589.2.3.1.1	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		
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	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		
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	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		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		RLE Lossless	1.2.840.10008.1.2.5		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		RLE Lossless	1.2.840.10008.1.2.5		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	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		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		RLE Lossless	1.2.840.10008.1.2.5		

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		
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		RLE Lossless	1.2.840.10008.1.2.5		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Angiographic Bi-Plane Image Storage SOP Class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	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		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	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		

4.2.2.3.1.3. 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.

4.2.2.3.1.3.1. 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 38: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful stored	

Service Status	Error Code	Further Meaning	Behavior
Refused	A700	Refused – Out of resources	Log; Release association; Release application; Retry to send the images.
Failure	0110	Error – Processing failure	Log; Release association; Release application; Retry to send the images
	A900	Error – Data set does not match SOP class	Log; Release association; Release application; Retry to send the images
	C000	Error – Cannot understand	Log; Release association; Release application; Retry to send the images
Warning	B000	Coercion of Data Elements	Log; Continue
	B007	Data Set does not match SOP Class	Log; Continue
	B006	Elements Discarded	Log; Continue

Exceptions:

1. If, after setting up the connection, no data can be sent to the external node for 60 seconds, Xcelera aborts the connection.
2. If an error occurs on Xcelera while setting up the connection, Xcelera aborts the connection.
3. If an error occurs on the target node while setting up the connection. If the retries are unsuccessful, the system will mark the data for later.
4. If an error occurs on Xcelera during image conversion or image transfer, Xcelera will abort the auto forward. A final error will be reported.
5. If an error occurs on the target node during data transfer, results the connection to be aborted Xcelera will report this error.
6. An error or warning concerning data transfer is received from the target node during data transfer. If it is related to the data being send, Xcelera tries to correct the cause of the error (e.g. by redoing the conversion). All information available on the error or warning will be reported.
7. Only the DICOM instances of the services where both parties agreed upon are forwarded, this will be reported.

During DICOM based auto-forward, transfer negotiations may indicate that the original format of the data is not accepted by the target node. In such cases, the DICOM ARCHIVVE server will try to apply one of the transfer syntax conversions indicated by '+', in order to get to transfer syntax that is supported by the external system.

Table 39: Transfer Syntax Conversion

Source Syntax	Destination Syntax		
	ILE	ELE	EBE
ILE	-	+	+
ELE	+	-	+
EBE	+	+	-
JPEG Baseline	-	-	-
JPEG Lossless FOP Non-Hierarchical 14	+	+	+
RLE	+	+	+

Table 40: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is closed and the reason is logged.
Association aborted	The association is closed and the reason is logged.

4.2.2.4. Association Acceptance Policy

Not applicable, Auto Export AE does not accept any associations.

4.2.3. Image Import AE

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

4.2.3.1. SOP Classes

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

Table 41: SOP Classes for Image Import AE

SOP Class Name	SOP Class UID	SCU	SCP
3D Object new Storage (Private)	1.3.46.670589.5.0.2.1	No	Yes
3D Subpage Store (Private)	1.3.46.670589.2.5.1.1	No	Yes
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1	No	Yes
Basic Text SR SOP Class	1.2.840.10008.5.1.4.1.1.88.11	No	Yes
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	No	Yes
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33	No	Yes
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	No	Yes
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	No	Yes
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	No	Yes
CX Synthetic Image Storage (Private)	1.3.46.670589.5.0.12	No	Yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	No	Yes
Enhanced SR SOP Class	1.2.840.10008.5.1.4.1.1.88.22	No	Yes
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	No	Yes
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	No	Yes
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	No	Yes
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	No	Yes
MR Synthetic Image Storage (Private)	1.3.46.670589.5.0.10	No	Yes
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	No	Yes
Perfusion (Private)	1.3.46.670589.5.0.13	No	Yes
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	No	Yes
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	No	Yes
RT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.481.1	No	Yes
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	No	Yes
Specialized PMS X-Ray Image Store (Private)	1.3.46.670589.2.3.1.1	No	Yes
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	No	Yes
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	No	Yes
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	No	Yes
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
Verification SOP Class	1.2.840.10008.1.1	No	Yes
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	No	Yes
X-Ray Angiographic Bi-Plane Image Storage SOP Class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	No	Yes
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	No	Yes
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	No	Yes

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

4.2.3.2. Association Policies

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

4.2.3.2.1. General

The DICOM standard application context is specified below.

Table 42: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

4.2.3.2.2. Number of Associations

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

Table 43: Number of associations as an Association Acceptor for this AE

Description	Value
Maximum number of simultaneous associations	Limit of system resources.

4.2.3.2.3. Asynchronous Nature

The implementation supports negotiation of multiple outstanding transactions, along with the maximum number of outstanding transactions supported.

Table 44: Asynchronous nature as an Association Initiator for this AE

Description	Value
Maximum number of outstanding asynchronous transactions	Not applicable.

4.2.3.2.4. Implementation Identifying Information

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

Table 45: DICOM Implementation Class and Version for Image Import AE

Implementation Class UID	1.3.46.670589.16.14.3.1.1
Implementation Version Name	Xcelera R3.1.L1

4.2.3.2.5. Communication Failure Handling

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

Table 46: Communication Failure Behavior

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

4.2.3.3. Association Initiation Policy

Not applicable, Image Import AE does not initiate any associations.

4.2.3.4. Association Acceptance Policy

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

Table 47: Association Reject Reasons

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

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

Table 48: Association Abort Policies

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.

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

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

4.2.3.4.1.1. Description and Sequencing of Activities

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

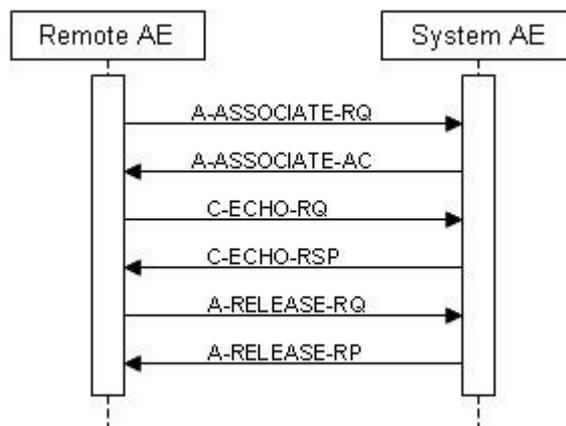


Figure 8: (Real World) Activity - Verification as SCP

4.2.3.4.1.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 49: Acceptable Presentation Contexts for (Real-World) Activity – Verification as SCP

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

The Import Image AE accepts all contexts in the intersection of the proposed and acceptable Presentation Context. This means that the Import Image AE will accept multiple proposed Presentation Contexts with the same SOP Class but different Transfer Syntaxes, so there will be no checks for duplicate Presentation Contexts.

4.2.3.4.1.3. 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.

4.2.3.4.1.3.1. 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 50: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Confirmation	Message in log file.

4.2.3.4.2. (Real-World) Activity – Image Import

4.2.3.4.2.1. Description and Sequencing of Activities

A remote system sets up an association with Xcelera. Xcelera verifies that the remote system is configured as an allowed SCU, and that the maximum number of associations is not already reached. If suitable, Xcelera will accept the association with a preferred presentation context. Then the remote system may transfer its image data to Xcelera. When the complete image has been received, Xcelera will send a C-STORE response to notify the remote system that the transfer is completed successfully and the remote system may release the association.

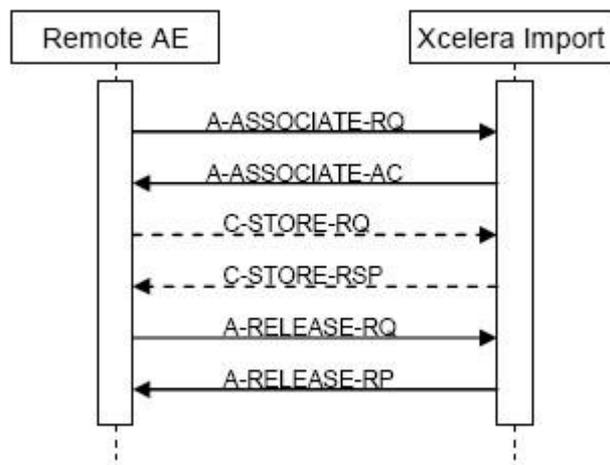


Figure 9: (Real World) Activity - Image Import

4.2.3.4.2.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 51: 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 Object new Storage (Private)	1.3.46.670589.5.0.2.1	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		
3D Subpage Store (Private)	1.3.46.670589.2.5.1.1	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		
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		
Basic Text SR SOP Class	1.2.840.10008.5.1.4.1.1.88.11	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		
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	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		
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	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		
CX Synthetic Image Storage (Private)	1.3.46.670589.5.0.12	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		
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	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		
Enhanced SR SOP Class	1.2.840.10008.5.1.4.1.1.88.22	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
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		
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	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		

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
MR Synthetic Image Storage (Private)	1.3.46.670589.5.0.10	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Perfusion (Private)	1.3.46.670589.5.0.13	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		
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	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		
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
RT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.481.1	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		
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 Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Specialized PMS X-Ray Image Store (Private)	1.3.46.670589.2.3.1.1	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		
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	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		
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	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 Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		RLE Lossless	1.2.840.10008.1.2.5		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		RLE Lossless	1.2.840.10008.1.2.5		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		RLE Lossless	1.2.840.10008.1.2.5		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		RLE Lossless	1.2.840.10008.1.2.5		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Angiographic Bi-Plane Image Storage SOP Class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

The Import Image AE accepts all Presentation contexts listed in the above table. This means that the Import Image AE will accept multiple proposed Presentation Contexts with the same SOP Class but different Transfer Syntaxes, so there will be no checks for duplicate Presentation Contexts.

4.2.3.4.2.3. 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.

Xcelera conforms to the SOP's of the Storage Service Class. Xcelera discards no data elements.

The images received by Xcelera are merged on Study UID and Series UID. For ultrasound images only the Image Information Entity level is supported.

The following are the restrictions and exceptions for the normal behavior of the Image

Import AE

1. Xcelera accepts connection from an external DICOM node as the system is licensed.
2. Xcelera try to notify the external DICOM node about the reason for not accepting the connection and will be reported.
3. If no agreement between the two parties can be reached concerning (DICOM) communication parameters the connection will be closed and no data transfer will take place and this will be reported.
4. Xcelera will close the connection if no data is received within 2 minutes after the setup and will be reported.
5. If a network error occurs during set up of a connection or during data transfer, this is reported. Xcelera will abort the connection and data transfer will not be completed.
6. By errors during data transfer Xcelera will notify the external DICOM node and closed the connection and will be reported.
7. Missing or empty mandatory DICOM Data. If Type 1 DICOM composite-object attributes are missing or empty then the system will:
 - a. Discard all data received for the associated object,
 - b. Return an appropriate DICOM error message to the DICOM image system making the store request,
8. If an object received has the same DICOM SOP Instance UID as an object already stored on Xcelera, Xcelera will do either of the following:

- If the already stored object has the same UID's on instance, study and series level as the new one, Xcelera will replace the stored object with the new object. This will not be communicated to the DICOM image system, which will thus perceive this as a normal store.

OR

- Depending on the configuration setting "Send Study after Finalized State or Time our Expired" on the Archive page of the service tool, the following will be done. When the study has the status "finalize" and has the same requirements as the previous bullet point, the study will be discarded and will be communicated to the external DICOM node with the status "C-STORE_WARNING_ELEMENTS_DISCARDED"
- If the already stored object has a different study or series UID as the new one; Xcelera will discard the object and send an error to the DICOM image system. The connection will remain open in order to allow the DICOM image system to recover from this error.

Xcelera Image Import AE supports the DICOM Structured Reports from any DICOM nodes. But it uses the DICOM SR objects for displaying and reporting of the measurement values of the Adult Echocardiography Report from the following systems only.

- Philips iE33 Release 1.1 and later
- Philips HD11 Release 1.1 and 1.2
- Philips Morpheus Release 1.0
- Philips Pathfinder Release 1.0
- GE Vivid 7 revision 4 and later
- GE Vivid I revision 4 and later
- Siemens Acuson Sequoia version 12.1 and later

4.2.3.4.2.3.1. Dataset Specific Conformance for C-STORE-RSP

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 52: C-STORE-RSP Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	
Refused		Remote is not Licensed	Log; Abort association.
Error		Abort by remote System	Log.
		Time-out reached	Log; Abort association.
	0110	Internal error Xcelera	Send notification; Log; Abort association.
	A900	Invalid dataset	Send notification; Log.

Table 53: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	Time-out for reception is set fixed to 2 minutes.

4.2.4. Print AE

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

4.2.4.1. SOP Classes

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

Table 54: SOP Classes for Print AE

SOP Class Name	SOP Class UID	SCU	SCP
Basic Annotation Box SOP Class	1.2.840.10008.5.1.1.15	Yes	No
Print Job SOP Class	1.2.840.10008.5.1.1.14	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.

4.2.4.2. Association Policies

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

4.2.4.2.1. General

The DICOM standard application context is specified below.

Table 55: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

4.2.4.2.2. Number of Associations

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

Table 56: Number of associations as an Association Initiator for this AE

Description	Value
Maximum number of simultaneous associations	1

4.2.4.2.3. Asynchronous Nature

The implementation supports negotiation of multiple outstanding transactions, along with the maximum number of outstanding transactions supported.

Table 57: Asynchronous nature as an Association Initiator for this AE

Description	Value
Maximum number of outstanding asynchronous transactions	Not applicable

4.2.4.2.4. Implementation Identifying Information

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

Table 58: DICOM Implementation Class and Version for Print AE

Implementation Class UID	1.3.46.670589.16.14.3.1.1
Implementation Version Name	Xcelera R3.1.L1

4.2.4.2.5. Communication Failure Handling

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

Table 59: Communication Failure Behavior

Exception	Behavior
ARTIM Timeout	The association is closed and the reason is logged.

4.2.4.3. Association Initiation Policy

The Application Entity will respond on a received reject Association attempt as shown in next table.

Table 60: Association Rejection response

Result	Source	Reason/Diagnosis	Behavior
1 - rejected-permanent	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - applicaton-context-name-not supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - protocol-version-not-supported	The user is informed. Details are logged in central log file.
	3 - DICOM UL service-provider(Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.

Result	Source	Reason/Diagnosis	Behavior
		2 - local-limit-exceeded	The user is informed. Details are logged in central log file.
2 - rejected-transient	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - application-context-name-not-supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - protocol-version-not-supported	The user is informed. Details are logged in central log file.
	3 - DICOM UL service-provider (Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.
		2 - local-limit-exceeded	The user is informed. Details are logged in central log file.

The behavior of the 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	When received, terminates the connection and logs the event.
	1 - unrecognized-PDU	When received, terminates the connection and logs the event.
	2 - unexpected-PDU	When received, terminates the connection and logs the event.
	4 - unrecognized-PDU-parameter	When received, terminates the connection and logs the event.
	5 - unexpected-PDU-parameter	When received, terminates the connection and logs the event.
	6 - invalid-PDU-parameter-value	When received, terminates the connection and logs the event.

4.2.4.3.1. (Real-World) Activity – Print Management As SCU

4.2.4.3.1.1. Description and Sequencing of Activities

Normal Flow of Events:

1. After the print job is selected a connection with the printer will be made.
2. The Xcelera send the job with or without annotation to the printer.

3. The printer prints its job and sends a successful response back to Xcelera.
4. Xcelera reports the success on the screen.

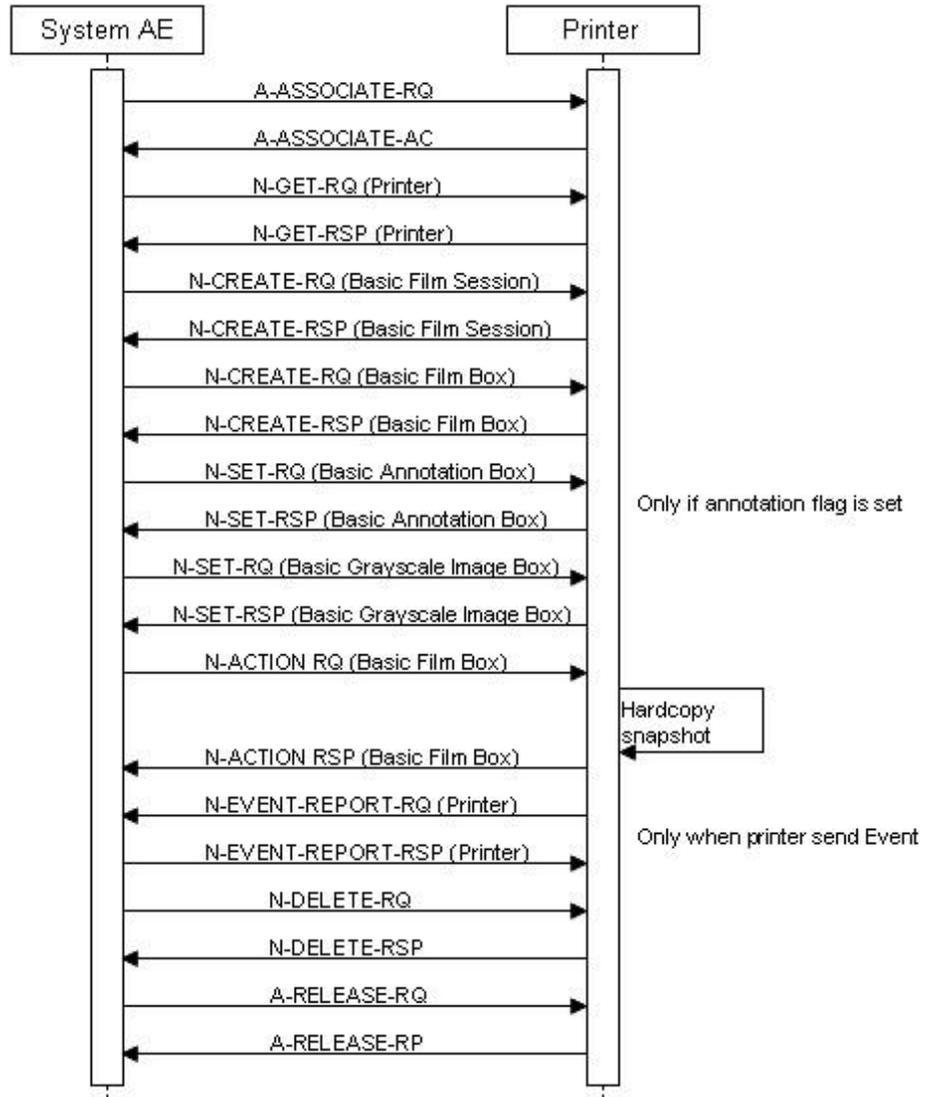


Figure 10: (Real World) Activity - Print Management As SCU

4.2.4.3.1.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 62: 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 Annotation Box SOP Class	1.2.840.10008.5.1.1.15	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Print Job SOP Class	1.2.840.10008.5.1.1.14	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		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		
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		

4.2.4.3.1.3. SOP Specific Conformance for Basic Annotation Box SOP Class

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

Exceptions:

The print job cannot be completed by the printer:

1. Printer errors are handled as given in the next table.
2. DICOM transfer errors to the printer are treated as normal DICOM transfer errors and are recorded appropriately.
3. The printer can use the Basic Annotation Box SOP Class when the annotation flag is set. A control on the SOP Classes during setup of the Association is used to check of the printer known this SOP Class.

Table 63: DICOM Command Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	
Warning/Failure	<>0000	(any warning/failure)	Log; Continue.
Error	<>0000	(any error)	Log; Abort.

4.2.4.3.1.3.1. Dataset Specific Conformance for Basic Annotation Box SOP Class N-SET-SCU

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

Table 64: Basic Annotation Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Annotation Position	2030,0010	US		ALWAYS	AUTO	
Text String	2030,0020	LO		ALWAYS	AUTO	Contains Patient Name (0010,0010).

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

Table 65: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is closed and the reason is logged.
Association aborted	The association is closed and the reason is logged.

4.2.4.3.1.4. SOP Specific Conformance for Print Job SOP Class

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

Exceptions:

The print job cannot be completed by the printer:

1. Printer errors are handled as given in the next table.
2. DICOM transfer errors to the printer are treated as normal DICOM transfer errors and are recorded appropriately.
3. The printer can use the Basic Annotation Box SOP Class when the annotation flag is set. A control on the SOP Classes during setup of the Association is used to check of the printer known this SOP Class.

Table 66: DICOM Command Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	
Warning/Failure	<>0000	(any warning/failure)	Log; Continue.
Error	<>0000	(any error)	Log; Abort.

4.2.4.3.1.4.1. Dataset Specific Conformance for Print Job N-EVENT-REPORT SCU

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

Xcelera does not respond to N-EVENT-REPORT from the Printer.

Note:

N-EVENT-REPORT is an asynchronous message from the printer in situations such as no film supply, low cartridge, print door opened, etc. Xcelera does not handle this and responds with either ABORT or releasing the association. On the User Interface the Print Job is displayed as failed and the user needs to resend the image.

4.2.4.3.1.5. 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.

The Print AE conforms to the Basic Film Box SOP Class. No data elements are discarded or coerced by the Print AE.

Exceptions:

The print job cannot be completed by the printer:

1. Printer errors are handled as given in the next table.
2. DICOM transfer errors to the printer are treated as normal DICOM transfer errors and are recorded appropriately.
3. The printer can use the Basic Annotation Box SOP Class when the annotation flag is set. A control on the SOP Classes during setup of the Association is used to check of the printer known this SOP Class.

Table 67: DICOM Command Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	
Warning/Failure	<>0000	(any warning/failure)	Log; Continue.
Error	<>0000	(any error)	Log; Abort.

4.2.4.3.1.5.1. 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 68: Basic Film Box Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Annotation Display Format ID	2010,0030	CS	ANNOTATION	ALWAYS	AUTO	
Film Orientation	2010,0040	CS	LANDSCAPE, PORTRAIT	ALWAYS	AUTO	
Image Display Format	2010,0010	ST	STANDARD, Value 2: 1,1, 1,2, 2,1, 2,2, 2,3, 3,2, 3,3, 3,4, 3,5, 4,4, 4,5, 4,6	ALWAYS	AUTO	

Table 69: 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		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 70: Status Response

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

Table 71: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	Print job Fails.
Reply Time-out	The association is rejected.
Association Time-out SCU	The association is released.
Association aborted	The Print job is marked as failed. The reason is logged and reported to the user.

4.2.4.3.1.5.2. Dataset Specific Conformance for Basic Film Box SOP Class N-ACTION-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 72: Status Response

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

Table 73: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	Print job Fails
Reply Time-out	The association is rejected
Association Time-out SCU	The association is released.
Association aborted	The Print job is marked as failed. The reason is logged and reported to the user.

4.2.4.3.1.6. SOP Specific Conformance for Basic Film Session 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.

Exceptions:

The print job cannot be completed by the printer:

1. Printer errors are handled as given in the next table.
2. DICOM transfer errors to the printer are treated as normal DICOM transfer errors and are recorded appropriately.
3. The printer can use the Basic Annotation Box SOP Class when the annotation flag is set. A control on the SOP Classes during setup of the Association is used to check of the printer known this SOP Class.

Table 74: DICOM Command Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	
Warning/Failure	<>0000	(any warning/failure)	Log; Continue.
Error	<>0000	(any error)	Log; Abort.

4.2.4.3.1.6.1. Dataset Specific Conformance for Basic Film Session SOP Class N-CREATE-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 75: Status Response

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

Table 76: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	Print job Fails
Reply Time-out	The association is rejected.
Association Time-out SCU	The association is released.
Association aborted	The Print job is marked as failed. The reason is logged and reported to the user.

4.2.4.3.1.7. SOP Specific Conformance for Basic Grayscale Image 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.

The Print AE conforms to the Basic Grayscale Image Box SOP Class. No data elements are discarded or coerced by the Print AE.

Exceptions:

The print job cannot be completed by the printer:

1. Printer errors are handled as given in the next table.
2. DICOM transfer errors to the printer are treated as normal DICOM transfer errors and are recorded appropriately.
3. The printer can use the Basic Annotation Box SOP Class when the annotation flag is set. A control on the SOP Classes during setup of the Association is used to check of the printer known this SOP Class.

Table 77: DICOM Command Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	
Warning/Failure	<>0000	(any warning/failure)	Log; Continue.
Error	<>0000	(any error)	Log; Abort.

4.2.4.3.1.7.1. 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 78: Image Box Pixel Presentation Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Box Position	2020,0010	US		ALWAYS	AUTO	
Requested Decimate/Crop Behavior	2020,0040	CS	DECIMATE	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 Aspect Ratio	0028,0034	IS	Value 1: 1\1	ALWAYS	AUTO	
>Pixel Data	7FE0,0010	O W/ OB		ALWAYS	AUTO	
>Pixel Representation	0028,0103	US	0	ALWAYS	AUTO	
>Planar Configuration	0028,0006	US		ANAP	CONFIG	Additional attribute.
>Rows	0028,0010	US		ALWAYS	AUTO	
>Samples per Pixel	0028,0002	US	1	ALWAYS	AUTO	
>Window Center	0028,1050	DS		ANAP	CONFIG	Additional attribute.
>Window Width	0028,1051	DS		ANAP	CONFIG	Additional attribute.

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	Image successfully stored in Image Box	The print job continues.
Warning	B604	Image Size is larger than Image Box Size – The Image has been de-magnified	The print job continues and the warning is logged and reported to the user.
	B605	Requested Min Density or Max Density outside of Printer's operating Range	The print job continues and the warning is logged and reported to the user.
	B609	Image Size is larger than Image Box Size – The Image has been cropped to fit	The print job continues and the warning is logged and reported to the user.
	B60A	Image Size or combined Print Image Size is larger than Image Box Size – The Image or combined Print Image has been decimated to fit	The print job continues and the warning is logged and reported to the user.
Error	C603	Image Size is larger than Image Box Size	The print job is marked as failed and the reason is logged and reported to the user.
	C605	Insufficient Memory in Printer to store the Image	The print job is marked as failed and the reason is logged and reported to the user.
	C613	Combined Print Image Size is larger than Image Box Size	The print job is marked as failed and the reason is logged and reported to the user.

Table 80: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	Print job Fails
Reply Time-out	The association is rejected.
Association Time-out SCU	The association is released.
Association aborted	The Print job is marked as failed. The reason is logged and reported to the user.

4.2.4.3.1.8. SOP Specific Conformance for Printer 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.

Exceptions:

The print job cannot be completed by the printer:

1. Printer errors are handled as given in the next table.
2. DICOM transfer errors to the printer are treated as normal DICOM transfer errors and are recorded appropriately.
3. The printer can use the Basic Annotation Box SOP Class when the annotation flag is set. A control on the SOP Classes during setup of the Association is used to check of the printer known this SOP Class.

Table 81: DICOM Command Response Status Handling Behavior

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	
Warning/Failure	<>0000	(any warning/failure)	Log; Continue.
Error	<>0000	(any error)	Log; Abort.

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

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

Xcelera does not respond to N-EVENT-REPORT from the Printer.

Note:

N-EVENT-REPORT is an asynchronous message from the printer in situations such as no film supply, low cartridge, print door opened, etc. Xcelera does not handle this and responds with either ABORT or releasing the association. On the User Interface the Print Job is displayed as failed and the user needs to resend the image.

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

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

Table 82: Printer Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Date of Last Calibration	0018,1200	DA		ALWAYS	AUTO	
Device Serial Number	0018,1000	LO		ALWAYS	AUTO	
Manufacturer	0008,0070	LO		ALWAYS	AUTO	
Manufacturer's Model Name	0008,1090	LO		ALWAYS	AUTO	
Printer Name	2110,0030	LO		ALWAYS	AUTO	
Printer Status	2110,0010	CS		ALWAYS	AUTO	
Printer Status Info	2110,0020	CS		ALWAYS	AUTO	
Software Version(s)	0018,1020	LO		ALWAYS	AUTO	
Time of Last Calibration	0018,1201	TM		ALWAYS	AUTO	

4.2.4.4. Association Acceptance Policy

Not applicable, Print AE does not accept any associations.

4.2.5. Query Retrieve as SCP AE

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

4.2.5.1. SOP Classes

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

Table 83: SOP Classes for Query Retrieve as SCP AE

SOP Class Name	SOP Class UID	SCU	SCP
3D Object new Storage (Private)	1.3.46.670589.5.0.2.1	Yes	No
3D Subpage Store (Private)	1.3.46.670589.2.5.1.1	Yes	No
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1	Yes	No
Basic Text SR SOP Class	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	Yes	No
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33	Yes	No
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Yes	No
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	Yes	No
CX Synthetic Image Storage (Private)	1.3.46.670589.5.0.12	Yes	No
Digital Mammography X-Ray Image Storage - Pres. SOP	1.2.840.10008.5.1.4.1.1.1.2	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Enhanced SR SOP Class	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	No
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	Yes	No
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	Yes	No
MR Synthetic Image Storage (Private)	1.3.46.670589.5.0.10	Yes	No
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Yes	No
Patient Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.1.1	No	Yes
Patient Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.1.2	No	Yes
PatientStudy Only QR Info. Model - FIND SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.1	No	Yes
PatientStudy Only QR Info. Model - MOVE SOP Class (Retired)	1.2.840.10008.5.1.4.1.2.3.2	No	Yes
Perfusion (Private)	1.3.46.670589.5.0.13	Yes	No
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	Yes	No
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	Yes	No
RT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.481.1	Yes	No
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	No
Specialized PMS X-Ray Image Store (Private)	1.3.46.670589.2.3.1.1	Yes	No
Study Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Study Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	No	Yes
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	Yes	No
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	No
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	No
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
Verification SOP Class	1.2.840.10008.1.1	No	Yes
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	Yes	No
X-Ray Angiographic Bi-Plane Image Storage SOP Class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	No

SOP Class Name	SOP Class UID	SCU	SCP
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	Yes	No

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

4.2.5.2. Association Policies

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

4.2.5.2.1. General

The DICOM standard application context is specified below.

Table 84: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

4.2.5.2.2. Number of Associations

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

The number of associations that Query Retrieve SCP AE can handle is up to 10. For the verification service at least one association can be handled simultaneously. The Query Retrieve SCP AE will only accept DICOM associations from other DICOM nodes whose AE titles are listed in the Xcelera configuration files. The storage part of the Query Retrieve SCP function can handle maximum of 5 associations simultaneously.

Table 85: Number of associations as an Association Initiator for this AE (C-STORE)

Description	Value
Maximum number of simultaneous associations	5

Table 86: Number of associations as an Association Acceptor for this AE (C-FIND, C-MOVE)

Description	Value
Maximum number of simultaneous associations	5

Table 87: Number of associations as an Association Acceptor for this AE (C-ECHO)

Description	Value
Maximum number of simultaneous associations	1

4.2.5.2.3. Asynchronous Nature

The implementation supports negotiation of multiple outstanding transactions, along with the maximum number of outstanding transactions supported.

Table 88: Asynchronous nature as an Association Initiator for this AE

Description	Value
Maximum number of outstanding asynchronous transactions	Not applicable

4.2.5.2.4. Implementation Identifying Information

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

Table 89: DICOM Implementation Class and Version for Query Retrieve as SCP AE

Implementation Class UID	1.3.46.670589.16.14.3.1.1
Implementation Version Name	Xcelera R3.1.L1

4.2.5.2.5. Communication Failure Handling

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

Table 90: Communication Failure Behavior

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

4.2.5.3. Association Initiation Policy

The Application Entity will respond on a received reject Association attempt as shown in next table.

Table 91: Association Rejection response

Result	Source	Reason/Diagnosis	Behavior
1 - rejected-permanent	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - applicaton-context-name-not supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.

Result	Source	Reason/Diagnosis	Behavior
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - protocol-version-not-supported	The user is informed. Details are logged in central log file.
	3 - DICOM UL service-provider (Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.
		2 - local-limit-exceeded	The user is informed. Details are logged in central log file.
2 - rejected-transient	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - application-context-name-not-supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - protocol-version-not-supported	The user is informed. Details are logged in central log file.
	3 - DICOM UL service-provider (Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.
		2 - local-limit-exceeded	The user is informed. Details are logged in central log file.

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

Table 92: 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	When received, terminates the connection and logs the event.
	1 - unrecognized-PDU	When received, terminates the connection and logs the event.
	2 - unexpected-PDU	When received, terminates the connection and logs the event.
	4 - unrecognized-PDU-parameter	When received, terminates the connection and logs the event.
	5 - unexpected-PDU-parameter	When received, terminates the connection and logs the event.
	6 - invalid-PDU-parameter-value	When received, terminates the connection and logs the event.

4.2.5.3.1. (Real-World) Activity – Image Export

4.2.5.3.1.1. Description and Sequencing of Activities

Normal flow of events:

1. Xcelera accepts the set up request of the remote node. Once the connection has been set up Xcelera receives the query request. In response Xcelera will send (0 of more) queues in the result. The connection will be closed.
2. A new connection will be set up for the retrieve request. If request was successful an association with the store remote node will be set up.
3. The requested data will be send to the store remote node
4. Connection with the store remote node and the request retrieve node will be closed.
5. Patient Study data will be updated with the latest information. (Refer to the tables in section 4.2.1.3.3.3 for the list of updated patient and study attributes.)

After the C-MOVE request the Query/Retrieve as SCP (C-STORE) will only export the requested images.

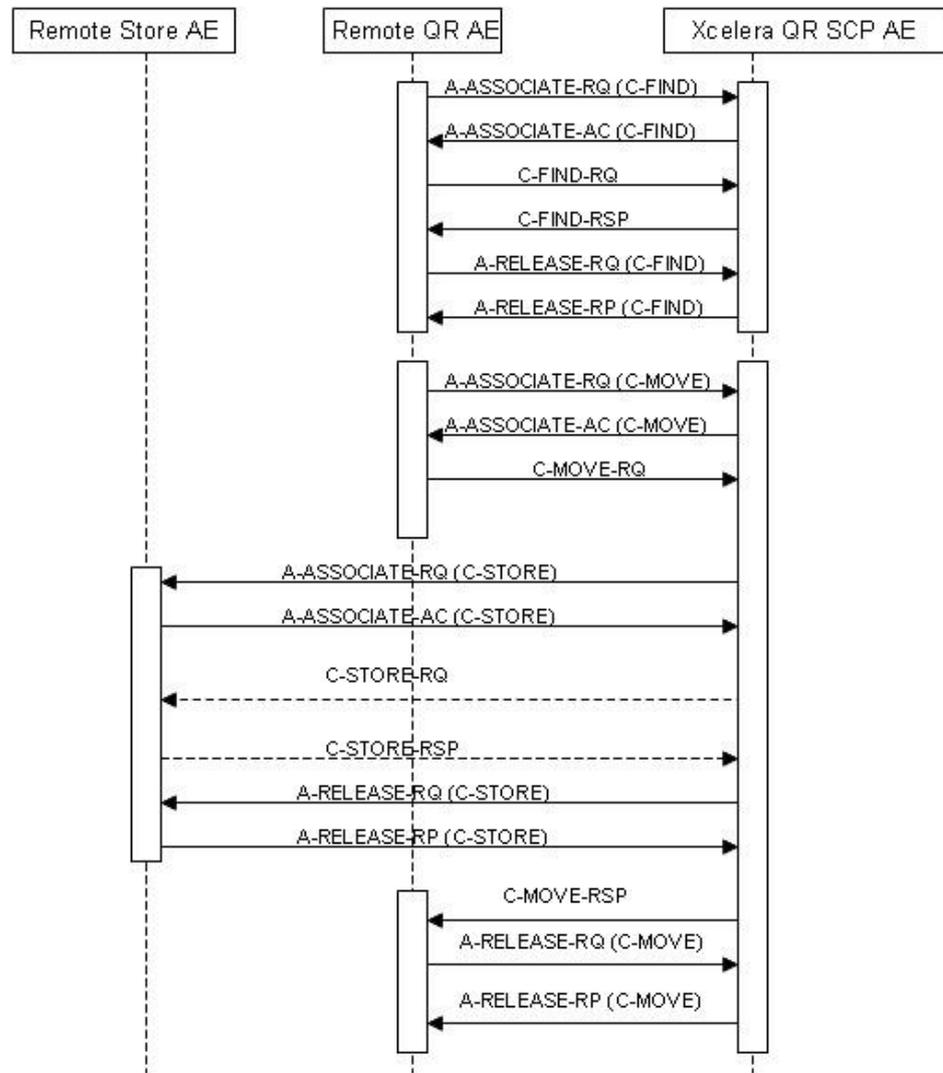


Figure 11: (Real World) Activity - Image Export

4.2.5.3.1.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 93: 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 Object new Storage (Private)	1.3.46.670589.5.0.2.1	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		
3D Subpage Store (Private)	1.3.46.670589.2.5.1.1	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		
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		
Basic Text SR SOP Class	1.2.840.10008.5.1.4.1.1.88.11	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		
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	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		
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33	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		
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	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		
CX Synthetic Image Storage (Private)	1.3.46.670589.5.0.12	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		
Digital Mammography X-Ray Image Storage - Pres. SOP	1.2.840.10008.5.1.4.1.1.1.2	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		
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	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		
Enhanced SR SOP Class	1.2.840.10008.5.1.4.1.1.88.22	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		
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	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	1.2.840.10008.5.1.4.1.1.11.1	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		
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	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		
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	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
MR Synthetic Image Storage (Private)	1.3.46.670589.5.0.10	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		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		
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Perfusion (Private)	1.3.46.670589.5.0.13	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		
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	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		
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
RT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.481.1	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		
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Specialized PMS X-Ray Image Store (Private)	1.3.46.670589.2.3.1.1	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		
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	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		
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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		
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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		
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
		Implicit VR Little Endian	1.2.840.10008.1.2		

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
		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		
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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		
X-Ray Angiographic Bi-Plane Image Storage SOP Class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
		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		
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
		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		
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	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		

4.2.5.3.1.3. 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.

Not mentioned SOP classes are also supported, but only with the stored transfer syntax. This implies that not mentioned SOP classes are handled in such manner that what comes in will be sent out.

- The DICOM Store SCU sends the same attribute values that were received
- The DICOM Store SCU updates the patient study with the latest information.
- The DICOM Store SCU supports all transfer syntaxes that are supported by DICOM import.
- The DICOM Store SCU supports conversion of transfer syntax (must be prepared to do a conversion from the transfer syntax in which the data is stored to the transfer syntax which is negotiated with the remote DICOM Store SOP Specific Conformance for SOP Classes.

- Only the DICOM instances of services where both parties agreed upon are stored, this will be reported.

4.2.5.3.1.3.1. 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 94: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful stored	
Refused	A700	Refused: Out of Resources	Log; Continue.
Error	0110	Error: Processing Failure	Log; Continue.
	A900	Error: Data Set does not match SOP Class	Log; Continue.
	C000	Error: cannot understand	Log; Continue.
Warning	B000	Coercion of Data Elements	Log; Continue.
	B007	Data Set does not match SOP Class	Log; Continue.
	B006	Elements Discarded	Log; Continue.

Table 95: DICOM Command Communication Failure Behavior

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

Exceptions:

1. If, after setting up the connection, no data can be sent to the external DICOM node for 2 minutes, Xcelera will retry once and then it will abort the connection and reports error
2. If an error occurs on Xcelera while setting up the connection, Xcelera will abort the connection and reports an error
3. If an error occurs on the external DICOM node while setting up the connection, Xcelera will abort all actions related to that connection and reports an error.
4. If no agreement between the two parties can be reached concerning communication parameters the connection will be closed and no data transfer will take place. Xcelera reports an error.
5. When a network error occurs during connection set up or during data transfer, Xcelera will abort all actions related to the connection and reports and error.

4.2.5.4. Association Acceptance Policy

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

Table 96: Association Reject Reasons

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

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

Table 97: Association Abort Policies

Source	Reason/Diagnosis	Behavior
0 - DICOM UL service-user (initiated abort)	0 - reason-not-specified	When received, terminates the connection and logs the event.

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

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

4.2.5.4.1.1. Description and Sequencing of Activities

The Query/Retrieve as SCP AE accepts associations from systems that wish to verify application level communication using the C-ECHO command.

4.2.5.4.1.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 98: 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		

4.2.5.4.1.3. 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.

The Query/Retrieve as SCP AE provides standard conformance. to Verification SOP Class

The Query/Retrieve as SCP (C-ECHO) accepts all contexts in the intersection of the proposed and acceptable Presentation Context. This means that the Query/Retrieve as SCP AE will accept multiple proposed Presentation Contexts with the same SOP Class but different Transfer Syntaxes, so there will be no checks for duplicate Presentation Contexts.

4.2.5.4.1.3.1. 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 99: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Confirmation	Message in log file.

4.2.5.4.2. (Real-World) Activity – FIND As SCP

4.2.5.4.2.1. Description and Sequencing of Activities

Xcelera allows the clinical user to query and retrieve data from other systems in the DICOM network. In communications with other nodes, Xcelera operates as a DICOM Query/Retrieve SCP and DICOM Store SCU, which are compatible with DICOM Query/Retrieve SCU and Store SCP provided by other products.

Query/Retrieve as SCP AE accepts associations from systems that wish to query Xcelera database using the C-FIND command.

4.2.5.4.2.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 100: 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		

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

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

The Query/Retrieve as SCP provides standard conformance.

The Query/Retrieve as SCP accepts all contexts in the intersection of the proposed and acceptable Presentation Context. This means that the Query/Retrieve as SCP will accept multiple proposed Presentation Contexts with the same SOP Class but different Transfer Syntaxes, so there will be no checks for duplicate Presentation Contexts.

If the C-FIND query is such that more than 1000 matches are found the Query/Retrieve SCP will return an error “out of resources” indicating there are more matches than the system can handle.

If a wildcards are used in a C-FIND, all matching records and all null records are returned by Xcelera.

4.2.5.4.2.3.1. 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 101: 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		Patient, Study, Series.
Specific Character Set	0008,0005	CS		
Q/R Image level				
Instance Number	0020,0013	IS		
SOP Instance UID	0008,0018	UI		
Q/R Patient level				
Patient ID	0010,0020	LO		
Patient's Birth Date	0010,0030	DA		
Patient's Name	0010,0010	PN		
Patient's Sex	0010,0040	CS		
Q/R Series level				
Body Part Examined	0018,0015	CS		
Modality	0008,0060	CS		
Performing Physician's Name	0008,1050	PN		
Protocol Name	0018,1030	LO		
Series Instance UID	0020,000E	UI		
Series Number	0020,0011	IS		
Q/R Study level				
Accession Number	0008,0050	SH		
Referring Physician's Name	0008,0090	PN		
Study Date	0008,0020	DA		
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 102: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete	No final identifier is supplied
Failed	A900	Invalid dataset	Related fields (0000,0901) (0000,0902)
Pending	FF01	Current match is supplied	Matches are continuing; Current match is supplied and any Optional Keys were supported in the same manner as Required Keys. (Related fields: identifier)
	FF01	Warning	Matches are continuing; Warning that one or more Optional Keys were not supported for existence and/or matching for this identifier (Related fields: identifier).
Refused	A700	Out of resources	Related fields (0000,0902)

If a query returns more than 1000 results, the system sends an “out of resources” messages back to the client instead of returning query results.

Table 103: DICOM Command 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.

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

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

The Xcelera Query/Retrieve SCP AE provides standard conformance to the Patient/Study only Q/R Information model.

4.2.5.4.2.4.1. 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 104: 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		Patient, Study.
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	
Patient's Name	0010,0010	PN	Single Value, Universal, WildCard	Wildcard matching not case sensitive.
Patient's Sex	0010,0040	CS	Single Value, Universal	
Q/R Study level				
Accession Number	0008,0050	SH		

Referring Physician's Name	0008,0090	PN		
Study Date	0008,0020	DA		
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 105: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete	The C-FIND request handling is completed, no more C-FIND responses are sent.
Refused	A700	Out of Resources	N/A
Failed	A900	Identifier does not match SOP class	N/A
	C000	Unable to process	The C-FIND request cannot be parsed. ViewForum R6.3 logs the reason.
Cancel	FE00	Matching terminated due to Cancel Request	The C-FIND request is canceled, no more C-FIND responses are sent.
Pending	FF00	Matches are continuing – Current match is supplied and any optional keys were supported in the same manner as required keys	The C-FIND responses are continuing.
	FF01	Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier	The C-FIND responses are continuing.

Table 106: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The query fails in case of association setup. The reason is logged.
Reply Time-out	The query fails and association is aborted. The reason is logged.

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

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

The Xcelera Query/Retrieve SCP AE provides standard conformance to the Study Root Q/R Information model.

4.2.5.4.2.5.1. 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 107: 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		Patient, Study, Series.
Specific Character Set	0008,0005	CS		
Q/R Image level				
Instance Number	0020,0013	IS	Single Value,Universal	
SOP Instance UID	0008,0018	UI	List Of UID,Single Value,Universal	
Q/R Series level				
Modality	0008,0060	CS	Single Value,Universal	
Series Instance UID	0020,000E	UI	List Of UID,Single Value,Universal	
Series Number	0020,0011	IS	Single Value,Universal	
Q/R Study level				
Accession Number	0008,0050	SH	Single Value,Universal	
Patient ID	0010,0020	LO	Single Value	
Patient's Birth Date	0010,0030	DA	Single Value,Universal,WildCard	
Patient's Name	0010,0010	PN	Single Value,Universal,WildCard	Wildcard matching not case sensitive.
Patient's Sex	0010,0040	CS	Single Value,Universal	
Referring Physician's Name	0008,0090	PN	Single Value,Universal	
Study Date	0008,0020	DA	Range,Single Value,Universal	
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	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 108: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete	The C-FIND request handling is completed, no more C-FIND responses are sent.
Refused	A700	Out of Resources	N/A
Failed	A900	Identifier does not match SOP class	N/A
	C000	Unable to process	The C-FIND request cannot be parsed. ViewForum R6.3 logs the reason.
Cancel	FE00	Matching terminated due to Cancel Request	The C-FIND request is canceled, no more C-FIND responses are sent.
Pending	FF00	Matches are continuing – Current match is supplied and any optional keys were supported in the same manner as required keys	The C-FIND responses are continuing.
	FF01	Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier	The C-FIND responses are continuing.

Table 109: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The query fails in case of association setup. The reason is logged.
Reply Time-out	The query fails and association is aborted. The reason is logged.

4.2.5.4.3. (Real-World) Activity – MOVE As SCP

4.2.5.4.3.1. Description and Sequencing of Activities

The Query/Retrieve as SCP AE accepts associations from systems that wish to retrieve images from Xcelera database using the C-MOVE service. The Query/Retrieve as SCP AE accepts all contexts in the intersection of the proposed and acceptable Presentation Context. This means that the Query/Retrieve as SCP AE will accept multiple proposed Presentation Contexts with the same SOP Class but different Transfer Syntaxes, so there will be no checks for duplicate Presentation Contexts.

4.2.5.4.3.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 110: 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		

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

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

The Xcelera Query/Retrieve as SCP AE provides standard conformance to Patient Root Q/R Information Model – MOVE SOP Class.

The Query/Retrieve as SCP AE supports all Query/Retrieve SOP classes. A C-STORE association is built after the C-MOVE request. The Query/Retrieve as SCP AE does not send intermediate C-MOVE responses with status pending.

4.2.5.4.3.3.1. 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 111: 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 Image level			
SOP Instance UID	0008,0018	UI	
Q/R Patient level			
Patient ID	0010,0020	LO	
Q/R Series level			
Series Instance UID	0020,000E	UI	
Q/R Study level			
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 112: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Sub-operations complete	No final identifier is supplied Related fields (0000,1020) (0000,1021) (0000,1022) (0000,1023).
Warning	B000	Sub-operations complete	One or more failures Related fields (0000,1020) (0000,1022) (0000,1023).
Failed	A900	Invalid dataset	Related fields (0000,0901) (0000,0902).
	C001	Unable to process	Related fields (0000,0901) (0000,0902).
Pending	FF00	Sub-operations are continuing	The move job continues.

Table 113: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The query fails in case of association setup. The reason is logged.
Reply Time-out	The query fails and association is aborted. The reason is logged.

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

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

The Xcelera Query/Retrieve as SCP AE provides standard conformance to Patient/Study Only Q/R Information Model – MOVE SOP Class.

4.2.5.4.3.4.1. 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 114: 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			
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 115: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Sub-operations complete	No final identifier is supplied Related fields (0000,1020) (0000,1021) (0000,1022) (0000,1023).
Warning	B000	Sub-operations complete	One or more failures Related fields (0000,1020) (0000,1022) (0000,1023).
Failed	A900	Invalid dataset	Related fields (0000,0901) (0000,0902).
	C001	Unable to process	Related fields (0000,0901) (0000,0902).

Table 116: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The query fails in case of association setup. The reason is logged.
Reply Time-out	The query fails and association is aborted. The reason is logged.

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

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

The Xcelera Query/Retrieve as SCP AE provides standard conformance to Study Root Q/R Information Model – MOVE SOP Class.

4.2.5.4.3.5.1. 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 117: 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 Image level			
SOP Instance UID	0008,0018	UI	
Q/R Series level			
Series Instance UID	0020,000E	UI	

Q/R Study level		
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 118: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Sub-operations complete	No final identifier is supplied. Related fields (0000,1020) (0000,1021) (0000,1022) (0000,1023).
Warning	B000	Sub-operations complete	One or more failures. Related fields (0000,1020) (0000,1022) (0000,1023).
Failed	A900	Invalid dataset	Related fields (0000,0901) (0000,0902).
	C001	Unable to process	Related fields (0000,0901) (0000,0902).

Table 119: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The query fails in case of association setup. The reason is logged.
Reply Time-out	The query fails and association is aborted. The reason is logged.

4.2.6. Query Retrieve as SCU AE

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

4.2.6.1. SOP Classes

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

Table 120: SOP Classes for Query Retrieve as SCU AE

SOP Class Name	SOP Class UID	SCU	SCP
Study Root QR Information Model - FIND SOP Class	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Study Root QR Information Model - MOVE SOP Class	1.2.840.10008.5.1.4.1.2.2.2	Yes	No

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

4.2.6.2. Association Policies

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

4.2.6.2.1. General

The DICOM standard application context is specified below.

Table 121: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

4.2.6.2.2. Number of Associations

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

Table 122: Number of associations as an Association Initiator for this AE

Description	Value
Maximum number of simultaneous associations	5

4.2.6.2.3. Asynchronous Nature

The implementation supports negotiation of multiple outstanding transactions, along with the maximum number of outstanding transactions supported.

Table 123: Asynchronous nature as an Association Initiator for this AE

Description	Value
Maximum number of outstanding asynchronous transactions	Not applicable

4.2.6.2.4. Implementation Identifying Information

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

Table 124: DICOM Implementation Class and Version for Query Retrieve as SCU AE

Implementation Class UID	1.3.46.670589.16.14.3.1.1
Implementation Version Name	Xcelera R3.1.L1

4.2.6.2.5. Communication Failure Handling

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

Table 125: Communication Failure Behavior

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

4.2.6.3. Association Initiation Policy

The Application Entity will respond on a received reject Association attempt as shown in next table.

Table 126: Association Rejection response

Result	Source	Reason/Diagnosis	Behavior
1 - rejected-permanent	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - applicaton-context-name-not supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - protocol-version-not-supported	The user is informed. Details are logged in central log file.
	3 - DICOM UL service-provider(Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.

Result	Source	Reason/Diagnosis	Behavior
		2 - local-limit-exceeded	The user is informed. Details are logged in central log file.
2 - rejected-transient	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - application-context-name-not-supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - protocol-version-not-supported	The user is informed. Details are logged in central log file.
	3 - DICOM UL service-provider (Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.
		2 - local-limit-exceeded	The user is informed. Details are logged in central log file.

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

Table 127: 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	When received, terminates the connection and logs the event.
	1 - unrecognized-PDU	When received, terminates the connection and logs the event.
	2 - unexpected-PDU	When received, terminates the connection and logs the event.
	4 - unrecognized-PDU-parameter	When received, terminates the connection and logs the event.
	5 - unexpected-PDU-parameter	When received, terminates the connection and logs the event.
	6 - invalid-PDU-parameter-value	When received, terminates the connection and logs the event.

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

4.2.6.3.1.1. Description and Sequencing of Activities

The Query/Retrieve as SCU AE initiates associations to other systems that support the Study Root Query/Retrieve C-FIND service.

Normal flow of events for C-FIND

1. Xcelera sets up a connection with the selected external DICOM node.
2. Once the connection has been set up and all communication parameters have been negotiated, Xcelera sends out the query information to the external DICOM node.
3. In response, the external DICOM node returns (0 or more) query results in the form of a list of studies that meet the search criteria entered earlier by the clinical user.
4. The connection will be closed by Xcelera.

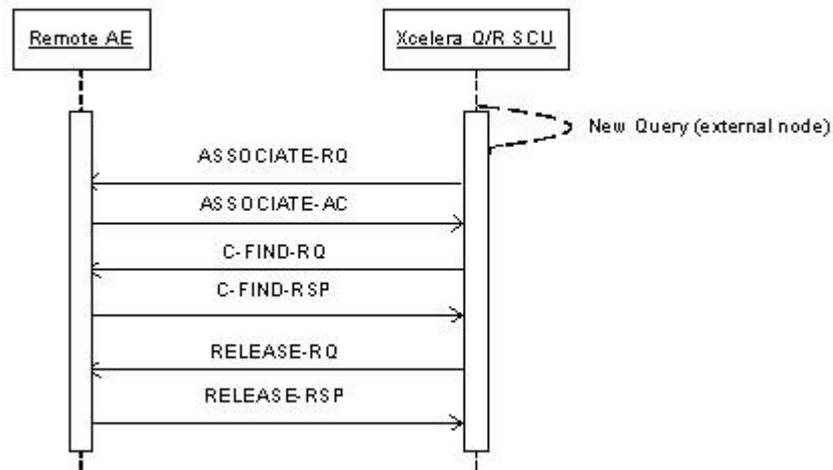


Figure 12: (Real World) Activity - FIND As SCU

Normal flow of events for C-MOVE

1. Xcelera sets up a request connection with the external DICOM node that provided the query results, and negotiates communication parameters.
2. Xcelera sends a retrieve request to the external DICOM node. The external DICOM node sets up a store connection with the Store SCP. Connection set up take place and is only accepted by the Store SCP, if the Query/Retrieve SCU has an open retrieve connection with the external DICOM node. Meanwhile it is possible to send C-MOVE-RSP PENDING to the Xcelera server.
3. The external DICOM node sends over the requested DICOM image data.
4. The connection will be closed by Xcelera.

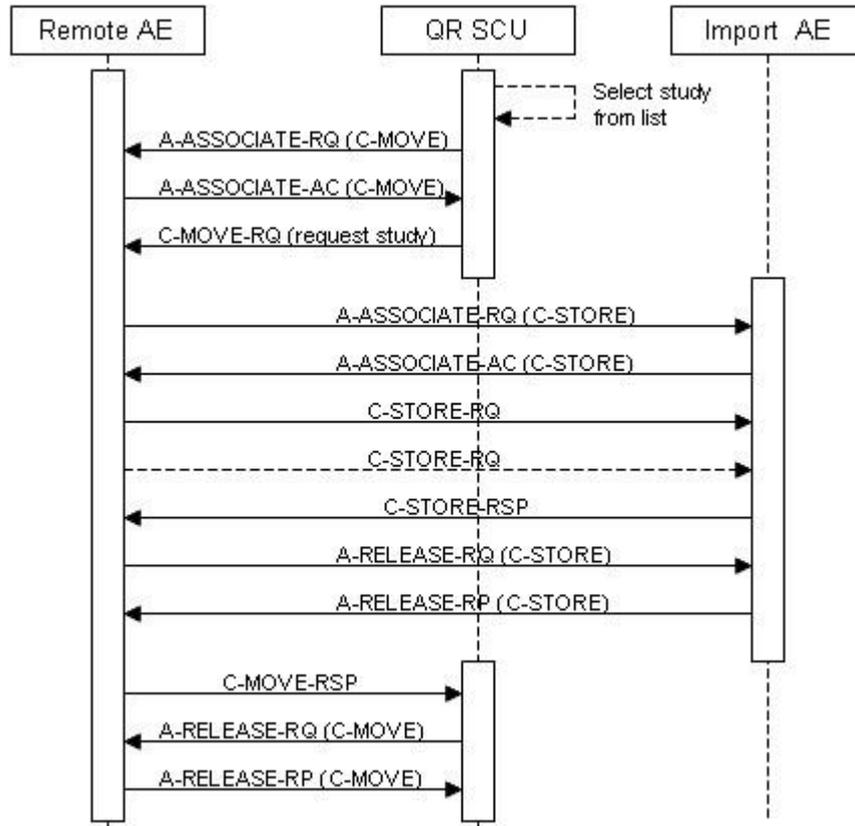


Figure 13: Flow diagram Retrieve DICOM image data from external DICOM node

4.2.6.3.1.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 128: 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		
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		

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

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

Only Study level queries are supported.

The Query/Retrieve as SCU AE supports queries based on the combination of the

following (Study level) attributes and attribute matching types (as defined in [DICOM] PS 3.4).

4.2.6.3.1.3.1. 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 129: Supported 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		
Specific Character Set	0008,0005	CS		
Q/R Image level				
Instance Number	0020,0013	IS		
SOP Instance UID	0008,0018	UI		
Q/R Series level				
Number of Series Related Instances	0020,1209	IS		
Series Instance UID	0020,000E	UI	Universal	
Series Number	0020,0011	IS		
Q/R Study level				
Accession Number	0008,0050	SH	Single Value, Universal, WildCard	
Modalities in Study	0008,0061	CS	Universal	
Patient ID	0010,0020	LO	Single Value, Universal, WildCard	
Patient's Birth Date	0010,0030	DA	Single Value, Universal	
Patient's Name	0010,0010	PN	Universal, WildCard	
Patient's Sex	0010,0040	CS	Single Value, Universal	
Study Date	0008,0020	DA	Range, Universal	
Study Instance UID	0020,000D	UI	Universal	

Note: The Patient's Name key attribute matching type is implicitly converted from Single Value matching to Wild Card matching by adding a Wild Card "*" character at the end of its value.

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

Table 130: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Matching is complete	
Refused	A700	Refused – Out of resources	Log; Release association.
Failed	A900	Error – Identifier does not match SOP class	Log; Release association.
	C001	Error – Unable to process	Log; Release association.
Cancel	FE00	Matching terminated due to cancel request	Log; Release association.
Pending	FF00	Matches are continuing – current match is supplied and any optional keys were supported in the same manner as required keys	Continue

Service Status	Error Code	Further Meaning	Behavior
	FF01	Matches are continuing – warning that one or more optional keys were not supported for existence and/or matching for this identifier	Continue

Table 131: DICOM Command 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.

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

4.2.6.3.2.1. Description and Sequencing of Activities

The Query/Retrieve as SCU AE initiates associations to other systems that support the Study Root Query/Retrieve C-MOVE service.

4.2.6.3.2.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 132: 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		
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		

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

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

Only Study level queries are supported. The Query/Retrieve as SCU AE supports queries based on the combination of the following (Study level) attributes and attribute matching types (as defined in [DICOM] PS 3.4).

4.2.6.3.2.3.1. 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 133: Identifiers for MOVE Study Root Information Model as SCU

Study Root Information Model			
Attribute Name	Tag	VR	Comment
Query/Retrieve Level	0008,0052	CS	
Q/R Image level			
SOP Instance UID	0008,0018	UI	
Q/R Series level			
Series Instance UID	0020,000E	UI	
Q/R Study level			
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 134: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Sub-operations complete – no failures	
Refused	A700	Refused – Out of resources	Log; Release association.
Failed	A900	Error – Identifier does not match SOP class	Log; Release association.
	C001	Error – Unable to process	Log; Release association.
Warning	B000	Sub-operations complete – one or more failures	The SCP has retrieved all requested images. Release association.
Cancel	FE00	Sub-operations terminated due to cancel request	Log; Release association.
Pending	FF00	Sub-operations are continuing	Continue.
	FF01	Sub-operations are continuing	Continue.

Exceptions:

1. The maximum number of parallel query/retrieve is reached. The request is queued by FIFO order.
2. At any point in time, an error occurs in the network or on the external DICOM node, Xcelera will close the connection and report an error
3. If an error occurs during data transfer, Xcelera will close the connection and report an error
4. If an error occurs on the external DICOM node while setting up the connection, Xcelera will abort all actions related to that connection and report an error.

Table 135: DICOM Command 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.

4.2.6.4. Association Acceptance Policy

Not applicable, the Query/Retrieve SCU AE doesn't accept any associations from other DICOM nodes.

4.2.7. Send AE

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

4.2.7.1. SOP Classes

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

Table 136: SOP Classes for Send AE

SOP Class Name	SOP Class UID	SCU	SCP
3D Object new Storage (Private)	1.3.46.670589.5.0.2.1	Yes	No
3D Subpage Store (Private)	1.3.46.670589.2.5.1.1	Yes	No
3D Volume Storage new SOP Class (Private)	1.3.46.670589.5.0.1.1	Yes	No
Basic Text SR SOP Class	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	Yes	No
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33	Yes	No
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Yes	No
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Yes	No
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	Yes	No
CX Synthetic Image Storage (Private)	1.3.46.670589.5.0.12	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Enhanced SR SOP Class	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	No
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	Yes	No
MR Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.4	Yes	No
MR Synthetic Image Storage (Private)	1.3.46.670589.5.0.10	Yes	No
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Yes	No
Perfusion (Private)	1.3.46.670589.5.0.13	Yes	No
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	Yes	No
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	Yes	No
RT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.481.1	Yes	No
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	Yes	No
Specialized PMS X-Ray Image Store (Private)	1.3.46.670589.2.3.1.1	Yes	No
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	Yes	No
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	No
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	No
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	Yes	No
X-Ray Angiographic Bi-Plane Image Storage SOP Class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	No
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	Yes	No

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

4.2.7.2. Association Policies

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

4.2.7.2.1. General

The DICOM standard application context is specified below.

Table 137: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

4.2.7.2.2. Number of Associations

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

For Xcelera the maximum number of associations limited by the availability of the system resources. The license number of the external DICOM nodes is one of these limits.

Table 138: Number of associations as an Association Initiator for this AE

Description	Value
Maximum number of simultaneous associations	5

4.2.7.2.3. Asynchronous Nature

The implementation supports negotiation of multiple outstanding transactions, along with the maximum number of outstanding transactions supported.

Table 139: Asynchronous nature as an Association Initiator for this AE

Description	Value
Maximum number of outstanding asynchronous transactions	Not applicable

4.2.7.2.4. Implementation Identifying Information

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

Table 140: DICOM Implementation Class and Version for Send AE

Implementation Class UID	1.3.46.670589.16.14.3.1.1
Implementation Version Name	Xcelera R3.1.L1

4.2.7.2.5. Communication Failure Handling

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

Table 141: Communication Failure Behavior

Exception	Behavior
ARTIM Timeout	The association is closed and the reason is logged.

4.2.7.3. Association Initiation Policy

The Application Entity will respond on a received reject Association attempt as shown in next table.

Table 142: Association Rejection response

Result	Source	Reason/Diagnosis	Behavior
1 - rejected-permanent	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - applicaton-context-name-not supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - protocol-version-not-supported	The user is informed. Details are logged in central log file.
	3 - DICOM UL service-provider (Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.
2 - local-limit-exceeded		The user is informed. Details are logged in central log file.	
2 - rejected-transient	1 - DICOM UL service-user	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - application-context-name-not-supported	The user is informed. Details are logged in central log file.
		3 - calling-AE-title-not-recognized	The user is informed. Details are logged in central log file.
		7 - called-AE-title-not-recognized	The user is informed. Details are logged in central log file.
	2 - DICOM UL service-provider (ACSE related function)	1 - no-reason-given	The user is informed. Details are logged in central log file.
		2 - protocol-version-not-supported	The user is informed. Details are logged in central log file.
	3 - DICOM UL service-provider (Presentation related function)	1 - temporary-congestion	The user is informed. Details are logged in central log file.
		2 - local-limit-exceeded	The user is informed. Details are logged in central log file.

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

Table 143: 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	When received, terminates the connection and logs the event.
	1 - unrecognized-PDU	When received, terminates the connection and logs the event.
	2 - unexpected-PDU	When received, terminates the connection and logs the event.
	4 - unrecognized-PDU-parameter	When received, terminates the connection and logs the event.
	5 - unexpected-PDU-parameter	When received, terminates the connection and logs the event.
	6 - invalid-PDU-parameter-value	When received, terminates the connection and logs the event.

4.2.7.3.1. (Real-World) Activity – Image Export

4.2.7.3.1.1. Description and Sequencing of Activities

Normal flow of events:

1. The user selects one or more studies from the list of studies being displayed.
2. After selection of the external DICOM node, Xcelera sets up a store connection and negotiates communications parameters with this external DICOM node. Connection set up is executed according to the DICOM Store protocols, with Xcelera acting as a DICOM Store SCU.
3. After this connection is set up, Xcelera sends the user selected study to the external DICOM node. Upon completion of this, the connection is closed. Start and end of the connection and data transfer are logged.
4. Patient Study data will be updated with the latest information. (Refer to the tables in section 4.2.1.3.3.3 for the list of updated patient and study attributes.)

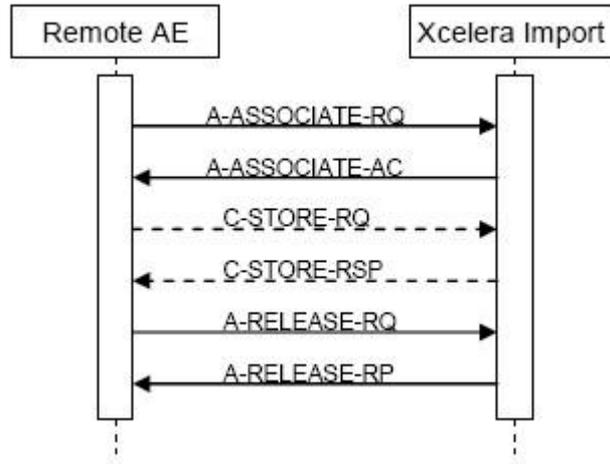


Figure 14: (Real World) Activity - Image Import

4.2.7.3.1.2. Proposed Presentation Contexts

The presentation contexts are defined in the next table.

Table 144: 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 Object new Storage (Private)	1.3.46.670589.5.0.2.1	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		
3D Subpage Store (Private)	1.3.46.670589.2.5.1.1	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		
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		
Basic Text SR SOP Class	1.2.840.10008.5.1.4.1.1.88.11	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		
Cardio Image Storage new SOP Class (Private)	1.3.46.670589.5.0.8.1	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		
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33	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		
Computed Radiography Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
CT Synthetic Image Storage (Private)	1.3.46.670589.5.0.9	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
CX Synthetic Image Storage (Private)	1.3.46.670589.5.0.12	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		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		
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	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		
Enhanced SR SOP Class	1.2.840.10008.5.1.4.1.1.88.22	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		
General ECG Waveform Storage SOP Class	1.2.840.10008.5.1.4.1.1.9.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	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	1.2.840.10008.5.1.4.1.1.11.1	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		
MR Cardio Analysis new Storage (Private)	1.3.46.670589.5.0.11.1	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		
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	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
MR Synthetic Image Storage (Private)	1.3.46.670589.5.0.10	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		
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
Perfusion (Private)	1.3.46.670589.5.0.13	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		
Perfusion Image Storage (Private)	1.3.46.670589.5.0.14	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		
Raw Data Storage SOP Class	1.2.840.10008.5.1.4.1.1.66	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
RT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.481.1	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		
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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		
Specialized PMS X-Ray Image Store (Private)	1.3.46.670589.2.3.1.1	JPEG Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Surface Storage new (Private)	1.3.46.670589.5.0.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		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		

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Angiographic Bi-Plane Image Storage SOP Class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
		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 Lossless, Non-Hierarchical, FOP (Process 14)	1.2.840.10008.1.2.4.70		
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		
XA reconstructed X-ray SOP Class (private)	1.3.46.670589.2.4.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
		Implicit VR Little Endian	1.2.840.10008.1.2		

4.2.7.3.1.3. 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.

The Send Image AE conforms to the SOP classes of the Storage Service Class at level 2 (full). No data elements are discarded or coerced by the Send Image AE.

4.2.7.3.1.3.1. 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 145: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Successful stored	
Refused	A700	Refused: Out of Resources	Log; continue.
Failure	0110	Error: Processing Failure	Log; continue.
	A900	Error: Data Set does not match SOP Class	Log; continue.
	C000	Error: cannot understand	Log; continue.
Warning	B000	Coercion of Data Elements	Log; continue.
	B007	Data Set does not match SOP Class	Log; continue.
	B006	Elements Discarded	Log; continue.

Exceptions:

1. The clinical user cancels the ‘Send’ request. If the request is already active, the store connection will be closed and the no more data will be sent. If the request is not active yet, no connection will be initiated and no data will be sent.
2. If, after setting up the connection, no data can be sent to the external DICOM node for 2 minutes, Xcelera will retry once and than it will abort the connection. Xcelera reports an error.
3. If an error occurs on Xcelera while setting up the connection, Xcelera aborts and reports an error
4. If an error occurs on the external DICOM node while setting up the connection, Xcelera will abort all actions related to that connection. Xcelera reports an error
5. If no agreement between the two parties can be reached concerning communication parameters the connection will be closed and no data transfer will take place. Xcelera reports an error.
6. When a network error occurs during connection set up or during data transfer, Xcelera will abort all actions related to the connection and reports an error.
7. If an error occurs on Xcelera during data transfer, Xcelera will notify the external DICOM node of this problem and after that close the connection. Xcelera reports an error.

8. If an error occurs on the external DICOM node during data transfer, this causes the connection to be aborted. Xcelera reports an error.

Notes:

1. If Institution Name is present in private DICOM object data it is taken from there (this only applies for CD import) If not - step 2.
2. If HIS is present and "resolve institution from HIS configured", then it is taken from HIS. If not - step 3.
3. If DICOM tag - Issuer of Patient ID (0010, 0021) in the Patient Identification Module - is not empty, Institution Name is taken from there. If not - step 4.
4. Institution Name is taken from the configuration data - default institution per AE_TITLE defined in the Service Tool (DICOM import page).

Table 146: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is closed and the reason is logged.
Association aborted	The association is closed and the reason is logged.
Not applicable, the Send AE doesn't accept any associations.	

4.2.7.4. Association Acceptance Policy

Not applicable, the Send AE doesn't accept any associations.

4.2.8. Storage Commitment AE

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

4.2.8.1. SOP Classes

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

Table 147: SOP Classes for Storage Commitment AE

SOP Class Name	SOP Class UID	SCU	SCP
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	No	Yes
Verification SOP Class	1.2.840.10008.1.1	No	Yes

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

4.2.8.2. Association Policies

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

4.2.8.2.1. General

The DICOM standard application context is specified below.

Table 148: DICOM Application Context

Description	Value
Application Context Name	1.2.840.10008.3.1.1.1

4.2.8.2.2. Number of Associations

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

For the verification service only one can be handled at a time.

Table 149: Number of associations as an Association Initiator for this AE

Description	Value
Maximum number of simultaneous associations	Limit of system resource

4.2.8.2.3. Asynchronous Nature

The implementation supports negotiation of multiple outstanding transactions, along with the maximum number of outstanding transactions supported.

Table 150: Asynchronous nature as an Association Initiator for this AE

Description	Value
Maximum number of outstanding asynchronous transactions	Limit of system resource

4.2.8.2.4. Implementation Identifying Information

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

Table 151: DICOM Implementation Class and Version for Storage Commitment AE

Implementation Class UID	1.3.46.670589.16.14.3.1.1
Implementation Version Name	Xcelera R3.1.L1

4.2.8.2.5. Communication Failure Handling

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

Table 152: Communication Failure Behavior

Exception	Behavior
ARTIM Timeout	The association is closed and the reason is logged.

4.2.8.3. Association Initiation Policy

Not applicable, Storage Commitment AE does not initiate any associations.

4.2.8.4. Association Acceptance Policy

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

Table 153: Association Reject Reasons

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

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

Table 154: Association Abort Policies

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.

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

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

4.2.8.4.1.1. Description and Sequencing of Activities

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

4.2.8.4.1.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 155: 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		

4.2.8.4.1.3. 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.

The Storage Commitment AE provides standard conformance to the verification SOP class.

4.2.8.4.1.3.1. 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 156: Status Response

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Confirmation	Message in log file.

4.2.8.4.2. (Real-World) Activity – Storage Commitment Push Model AS SCP

4.2.8.4.2.1. Description and Sequencing of Activities

Xcelera will support DICOM Storage commitment as SCP, only for asynchronous workflow. The C-STORE, N-ACTION and N-EVENT-REPORT will be handled in a separate association.

Normal Flow of Events:

1. The external DICOM node set up storage commit request connection and negotiates communication parameters with the Xcelera server.
2. After the connection is setup, the external DICOM node sends a storage commit request for the data, where the responsibility has to be taken over by the Xcelera server.
3. The Xcelera server responds to the external DICOM node that the request is correctly received.
4. The external DICOM node will close the connection.

When the data is correctly archived (archived and verified):

1. The Xcelera server set up storage commit response connection and negotiates communication parameters with the external DICOM node that made the request.
2. After the connection is setup, the Xcelera server sends the storage commit response, for the request it received, to the external DICOM node.
3. The Xcelera server will close the connection.

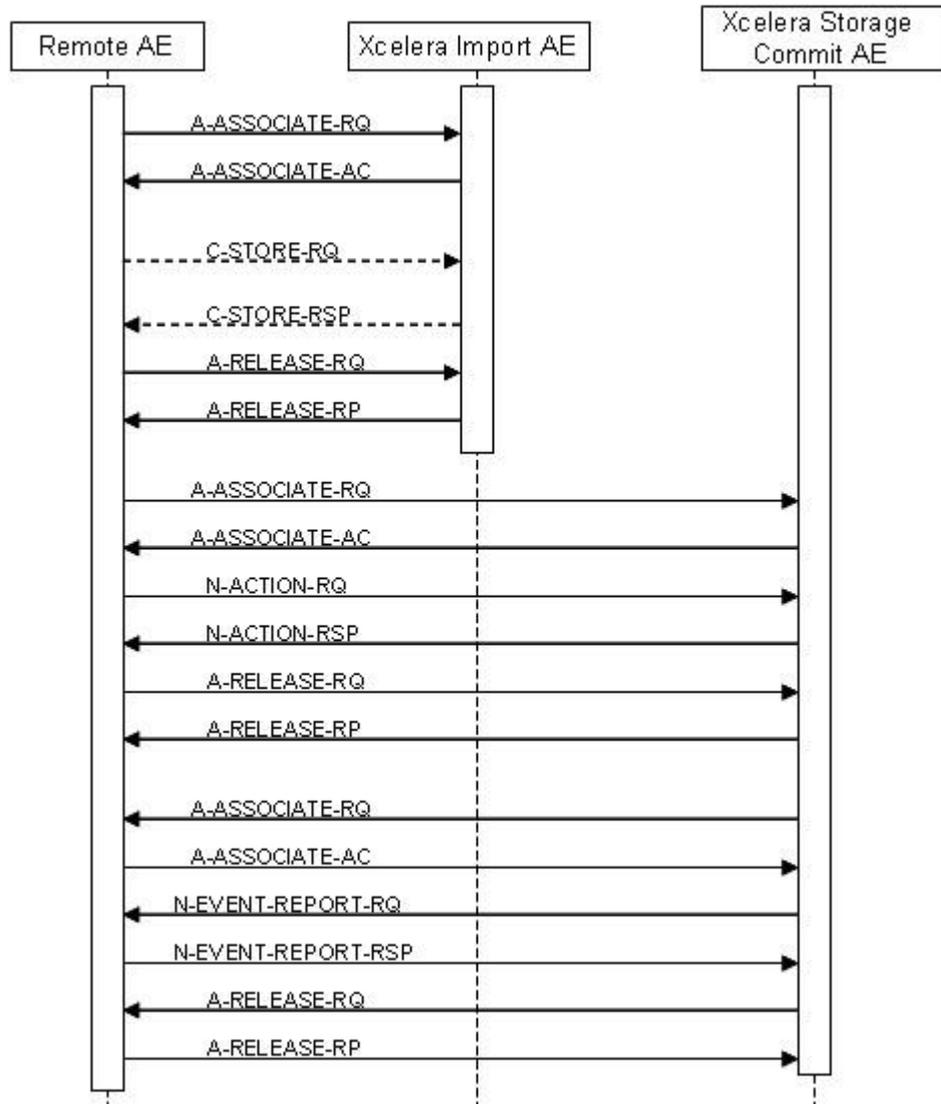


Figure 15: (Real World) Activity - Storage Commitment Push Model as SCP

4.2.8.4.2.2. Accepted Presentation Contexts

The presentation contexts are defined in the next table.

Table 157: Acceptable Presentation Contexts for (Real-World) Activity – Storage Commitment Push Model AS SCP

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Implicit VR Little Endian	1.2.840.10008.1.2		

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

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

4.2.8.4.2.3.1. Dataset Specific Conformance for Storage Commitment Push Model SOP Class N-EVENT-REPORT-SCU

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

The Storage Commitment AE accepts all contexts in the intersection of the proposed and acceptable Presentation Context. This means that the Storage Commitment AE will accept multiple proposed Presentation Contexts with the same SOP Class but different Transfer Syntaxes, so there will be no checks for duplicate Presentation Contexts.

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

Table 158: Status Response

ServiceStatus	Error Code	Further Meaning	Description
Success	0000	Success	
Error	0110	Processing Failure	Send notification; Log.

Table 159: DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is closed and the reason is logged.
Association aborted	The association is closed and the reason is logged.

4.2.8.4.2.3.2. Dataset Specific Conformance for Storage Commitment Push Model SOP Class N-ACTION-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 160: Status Response

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

Table 161: DICOM Command Communication Failure Behavior

Exception	Behavior
ARTIM Time-out	The reason is logged.

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

Exceptions:

1. Not correctly archived within the verify delay + 72 hours, Xcelera responds with a failure.
2. All instances in the request have to be correctly archived, when one of them fails, the response will be reported with failure.
3. If no agreement between the two parties can be reached concerning (DICOM) communication parameters the connection will be closed and no data transfer will take place.
4. Xcelera will close the connection if no data is received within 2 minutes after the setup.
5. If a network error occurs during set up of a connection or during data transfer, this is reported. Xcelera will abort the connection and data transfer will not be completed.
6. If an error occurs on Xcelera during data transfer, Xcelera will notify the external DICOM node of this problem and after that close the connection. Xcelera reports an error.
7. If an error occurs on the external DICOM node during data transfer, this causes the connection to be aborted. Xcelera reports an error.

4.3. Network Interfaces

4.3.1. Physical Network Interfaces

The System 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, 10BASE-T

IEEE 802.3-1995, 100BASE-TX (Fast Ethernet)

IEEE 802.3, 1000BASE-X (Fiber Optic Gigabit Ethernet).

The TCP/IP Stack as supported by the underlying Operating System.

The API is the WinSock 2 interface as supported by the underlying Operating System.

4.3.2. Additional Protocols

Xcelera operates according to DICOM protocols, in the application layer of standardized communications networks. From this perspective the system supports a number of protocol stacks and physical network media. The system supports DICOM protocols on top of the TCP/IP version 4.

A PPP Connection over dial-up line in the same network is possible.

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.

In Xcelera the local Network and Media AE titles as well as the IP Address and the TCP listen port associated with these AE are configurable. The different AE's in Xcelera can be configured to use the same AE title.

Xcelera only accepts associations of AE Titles that are configured in Xcelera.

Due to variety of network configurations that exist worldwide, no performance guaranties can be given with respect to the time it takes to complete the execution of a job.

4.4.1.1. Local AE Titles

The local AE title mapping and configuration are specified as:

Table 162: AE Title configuration table

Application Entity	Default AE Title	Default TCP/IP Port
Image Import AE	INTURISPRO_SCP	104
Send AE	SEND_SCU	NA
Auto Export AE	INTURISPRO_SCU	NA
Storage Commitment AE	STCO_SCP	4000

Application Entity	Default AE Title	Default TCP/IP Port
Query/Retrieve as SCU AE	QR_SCU	NA
Query/Retrieve as SCP AE	QR_SCP	7000
Print AE	VIEWER_PRINT_SCU	104
Archive AE	Configurable	Configurable

4.4.1.2. Remote AE Title/Presentation Address Mapping

The configuration of the remote application is specified here.

Table 163: Remote AE Title Configuration Table

AE Configuration	Description
Image Import AE	Import AE Title
	Hostname
	IP-address
	Listen Port
	Allowed AE Title
	Processing delay
	Archive data (yes/no)
	TTL (Time To Live) When not archiving
Auto Export AE	SCP AE Title
	SCU AE Title
	Server IP Address
	Port number
	Server Name
	Server description
	Server path
	Username
	Password
Jpeg Quality Factor	
Send AE	AE Title
	Send queue TTL (Days)
	Client AE Title
	Hostname
	IP-address
	Port number
Storage Commitment AE	Logical name
	AE Title
	Listen port
	Hostname
	Allowed AE Title
Query/Retrieve as SCU AE	Port number
	Q/R SCU AE Title
	Q/R SCU Dicom Timeout
	Q/R SCU Retrieve Timeout
	Store SCU AE Title
	Q/R SCP AE Title
	Hostname
	IP-Address
	Port number
	Logical name
Query/Retrieve as SCP AE	Q/R SCP AE Title
	Listen Port
	Store SCU AE Title
	Allowed Client SCU AE Title

AE Configuration	Description
	Store SCP AE Title
	Hostname
	IP-address
	Port number
Print AE	AE Title
	IP-address
	Hostname
Archive AE	Store SCU AE Title
	Archive Hostname
	Archive IP-address
	Archive Store SCU AE Title
	Archive Store SCP AE Title
	Archive SCP port number
	Archive Q/R SCP Hostname
	Archive Q/R SCP IP-Address
	Archive Q/R AE Title
	Archive Q/R port number
	Fetch Move SCU AE Title
	Archive Storage Commit SCP hostname
	Archive Storage Commit IP-Address
	Archive Storage Commit SCP AE Title
	Archive Storage Commit port number
	Read only (yes/no)
	Fetch Time out
	Server Path
	User Name

4.4.2. Parameters

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

Table 164: Configuration Parameters Table

Parameter	Configurable	Default Value
General Parameters		
Max PDU Receive Size	No	28 Kbytes
Max PDU Send Size	No	28 Kbytes
Time-out for completion of a TCP/IP connect request (Low-level timeout).	No	60 seconds
Time-out awaiting a Response to a DIMSE Request (Low-level timeout).	No	60 seconds
Time-out for waiting for data between TCP/IP-packets (Low-level timeout).	No	60 seconds
Storage Parameters		
Storage SCU time-out waiting for a response to a C-STORE RQ	No	60 seconds
Time out for reception	No	2 minutes
Maximum number of simultaneously initiated Associations by the Storage AE	No	10
Supported Transfer Syntaxes (separately configurable for each remote AE)	No	
Query/Retrieve Parameters (SCU and SCP)		
Maximum PDU size	No	28 Kbytes
Maximum Number of simultaneous Associations (SCU)	No	1 (C-ECHO), 5 (C-STORE), 5 (C-FIND), 1 (Printer), 1 (Archiving)

Parameter	Configurable	Default Value
Q/R SCU DICOM Timeout (SCU)	Yes {300-1500}	450 seconds
Q/R SCU Retrieve Timeout (SCU)	Yes {1..7}	1 days
Q/R best case query response time (SCP)	No	2 seconds
Q/R worst case query response time (SCP)	No	10 seconds
Storage Commitment Specific Parameters		
Maximum time to wait for cases to be archived	Yes	Maximum 8 hours
Maximum number of times for retrying sending a response – with one hours interval	Yes	Maximum 72 times
Print Parameters		
Maximum number of simultaneous Associations	No	1
Maximum numbers of connected printers	No	5

Additional configuration parameters such as hardware options for e.g. a printer are specified as well.

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

As part of the implementation model, an application data flow diagram is included. This diagram represents all of the Application Entities present in an implementation and graphically depicts the relationship of the AE's use of DICOM to Real-World Activities.

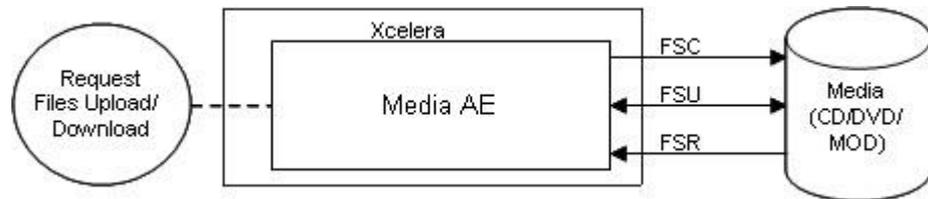


Figure 16: Application Data Flow Diagram

Note: DICOM FSU with DVD is not possible.

5.1.2. Functional Definitions of AE's

The Media AE in an Xcelera supports the following functions for CD-R, MOD, DVD:

- Read the DICOMDIR File from the medium (representing the directory of the DICOM File(s) as recorded on the medium). This information may be displayed as an ordered list of icon images and, if present, with pertinent identifying information (patient name, etc.).
- Read the selected image from the medium and display it on the monitor of the View Station. This information is displayed as an ordered list of frames of the selected image or as a dynamic review of the selected image.

And for CD-R, DVD:

- Initialize the medium.
- Write a DICOM File-set onto the medium.
- Create a DICOMDIR File.
- Extend the DICOM File-set and update the DICOMDIR File accordingly. (DICOM Media Storage Service Class).

Note: It is not possible to finalize the DVDs from Xcelera. Because of this the studies written on DVD by Xcelera can only be read by Xcelera.

5.1.3. Sequencing of Real World Activities

This section contains a description of sequencing of Real-World Activities that the Media Application Entities require.

Table 165: Conformance Supported Application Profiles

Application Profile Identifier	Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax Name	Transfer Syntax UID
STD-XABC-CD	X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	JPEG Lossless FOP	1.2.840.10008.1.2.4.70
STD-XA1K-CD	X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	JPEG Lossless FOP	1.2.840.10008.1.2.4.70
	Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	ELE	1.2.840.10008.1.2.1
STD-US-ID-SF-CD	Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	ELE	1.2.840.10008.1.2.1
STD-US-ID-SF-MOD*			JPEG Lossy Baseline	1.2.840.10008.1.2.4.50
STD-US-ID-SF-DVD			RLE	1.2.840.10008.1.2.5
STD-US-ID-MF-CD	Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	ELE	1.2.840.10008.1.2.1
STD-US-ID-MF-MOD*			JPEG Lossy Baseline	1.2.840.10008.1.2.4.50
STD-US-ID-MF-DVD			RLE	1.2.840.10008.1.2.5
STD-GEN-CD/ DVD	Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	ELE	1.2.840.10008.1.2.1
	CT Image Storage	1.2.840.10008.5.1.4.1.1.2		
	Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20		
	X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1		
	X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2		
	Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1		
	MR Image Storage	1.2.840.10008.5.1.4.1.1.4		
	Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1		
	Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7		
ALL	Media Storage Directory Storage	1.2.840.10008.1.3.10	ELE	1.2.840.10008.1.2.1

5.2. AE Specifications

This section in the DICOM Conformance Statement specifies a set of Media Application Entities.

5.2.1. Media AE Media - Specification

If applicable, this section contains a description of sequencing of Real-World Activities that the AE's require.

Depending on the study size, the viewer can write one or more complete studies to one or more CD's. Furthermore one viewer can review and upload:

- Multi-patient CDs and DVDs;
- Multi-study CDs and DVDs;
- Multi-CD studies.

The supported Application Profiles, their Roles and the Service Class (SC) options, all defined in DICOM terminology, are listed in next table.

Table 166: AE Media AE related Application Profiles, RWA activities and roles

Supported Application Profile	Identifier	Real-World Activities	Roles
1024 X-Ray Angiographic Studies on CD-R	STD-XA1K-CD	Update File-set Create File-set Read File-set	FSU FSC FSR
Basic Cardiac X-RAY Angiographic Studies on CD-R	STD-XABC-CD	Update File-set Create File-set Read File-set	FSU FSC FSR
CT/MR Studies on CD-R	STD-CTMR-CD	Update File-set Create File-set Read File-set	FSU FSC FSR
General Purpose CD-R Interchange	STD-GEN-CD	Update File-set Create File-set Read File-set	FSU FSC FSR
Image Display (Ultrasound {SF MF})	STD-US-ID-SF-CDR/STD-US-ID-MF-CDR	Update File-set Create File-set Read File-set	FSU FSC FSR
CT/MR Studies on DVD Media	STD-CTMR-DVD	Create File-set Read File-set	FSC FSR
General Purpose DVD Interchange with JPEG	STD-GEN-DVD-JPEG	Create File-set Read File-set	FSC FSR
Image Display (Ultrasound {SF MF})	STD-US-ID-SF-DVD/STD-US-ID-MF-DVD	Create File-set Read File-set	FSC FSR
CT/MR Studies on 1.2GB MOD	STD-CTMR-MOD12	Read File-set	FSR
CT/MR Studies on 2.3GB MOD	STD-CTMR-MOD23	Read File-set	FSR
CT/MR Studies on 4.1GB MOD	STD-CTMR-MOD41	Read File-set	FSR
CT/MR Studies on 650MB MOD	STD-CTMR-MOD650	Read File-set	FSR
Image Display (Ultrasound {SF MF}) on 1.2GB 130mm MOD	STD-US-ID-SF-MOD12/STD-US-ID-MF-MOD12	Read File-set	FSR
Image Display (Ultrasound {SF MF}) on 128MB MOD	STD-US-ID-SF-MOD128/STD-US-ID-MF-MOD128	Read File-set	FSR
Image Display (Ultrasound {SF MF}) on 2.3GB 130mm MOD	STD-US-ID-SF-MOD23/STD-US-ID-MF-MOD23	Read File-set	FSR
Image Display (Ultrasound {SF MF}) on 230MB 90mm MOD	STD-US-ID-SF-MOD230/STD-US-ID-MF-MOD230	Read File-set	FSR
Image Display (Ultrasound {SF MF}) on 540MB 90mm MOD	STD-US-ID-SF-MOD540/STD-US-ID-MF-MOD540	Read File-set	FSR
Image Display (Ultrasound {SF MF}) on 650MB 130mmMOD	STD-US-ID-SF-MOD650/STD-US-ID-MF-MOD650	Read File-set	FSR

5.2.1.1. File Meta Information for the Media AE

The Application Entity title is registered in the DICOM File Meta Information header and is supported by the CD/DVD-writer (CD write option) acting as FSC/FSU.

Table 167: File Meta Information for the Media AE

Implementation Class UID	1.3.46.670589.16.14.3.1.1
Implementation Version Name	Xcelera R3.1.L1

5.2.1.2. Real-World Activities

The AE specification contains a description of the Real-World Activities, which invoke the particular AE.

5.2.1.2.1. RWA - Read File-set

This Media Application Entity has a File-set Reader functionality which is described here.

For the Real World Activity Read File-set (DICOM Reading), the Media AE will act as an FSR using the Interchange option when reading the directory of the medium and when reading the requested images.

5.2.1.2.1.1. Media Storage Application Profile

See table below for an overview of the support of the Application Profiles.

Table 168: Supported Application Profiles

Application Profile	Identifier	Real World Activity	Role	SC Option
CT/MR Studies on {650MB 1.2GB 2.3GB 4.1GB} MOD	STD-CTMR-MOD*	Read image(s) from MOD	FSR	Interchange
CT/MR Studies on CD-R	STD-CTMR-CD	Read image(s) from CD	FSR	Interchange
CT/MR Studies on DVD Media	STD-CTMR-DVD	Read image(s) from MOD	FSR	Interchange
General Purpose CD-R Interchange	STD_GEN-CD	Read image(s) from CD	FSR	Interchange
General Purpose Interchange on DVD Media	STD-GEN-DVD	Read image(s) from MOD	FSR	Interchange
Basic cardiac X-Ray Angiographic Studies on CD-R media	STD-XABC-CD	Read image(s) from CD	FSR	Interchange
1024 X-Ray Angiographic Studies on CD-R Media	STD-XA1K-CD	Read image(s) from CD	FSR	Interchange
Image Display (Ultrasound {SF MF})	STD-US-ID-MF-CDR	Read image(s) from CD	FSR	Interchange
	STD-US-ID-SF-CDR	Read image(s) from CD	FSR	Interchange
	STD-US-ID-MF-MOD*	Read image(s) from MOD	FSR	Interchange
	STD-US-ID-SF-MOD*	Read image(s) from MOD	FSR	Interchange
	STD-US-ID-SF-DVD	Read image(s) from DVD	FSR	Interchange
	STD-US-ID-MF-DVD	Read image(s) from DVD	FSR	Interchange

* The supported MOD (FSR) Application Profiles include all Application Profiles where MOD* is MOD12, MOD23, MOD128, MOD230, MOD540, or MOD650.

5.2.1.2.1.1.1. Options

Not applicable.

5.2.1.2.2. RWA - Create File-set

This Media Application Entity has a File-set Creator functionality which is described here.

For the Real World Activities DICOM Recording the Media AE will write the SOP instances as provided by the RWA to the record able DICOM medium and a corresponding DICOMDIR is created.

5.2.1.2.2.1. Media Storage Application Profile

See table below for an overview of the support of the Application Profiles.

Table 169: Supported Application Profiles

Application Profile	Identifier	Real World Activity	Role	SC Option
CT/MR Studies on CD-R	STD-CTMR-CD	Write image(s) to CD-R	FSC	Interchange
CT/MR Studies on DVD Media	STD-CTMR-DVD	Write image(s) to CD-R	FSC	Interchange
General Purpose CD-R Interchange	STD_GEN-CD	Write image(s) to CD-R	FSC	Interchange
General Purpose Interchange on DVD Media	STD-GEN-DVD	Write image(s) to DVD-RAM	FSC	Interchange
Basic cardiac X-Ray Angiographic Studies on CD-R media	STD-XABC-CD	Write image(s) to CD-R	FSC	Interchange
1024 X-Ray Angiographic Studies on CD-R Media	STD-XA1K-CD	Write image(s) to CD-R	FSC	Interchange
Image Display (Ultrasound {SF MF})	STD-US-ID-MF-CDR	Write image(s) to CD-R	FSC	Interchange
	STD-US-ID-SF-CDR	Write image(s) to CD-R	FSC	Interchange
	STD-US-ID-SF-DVD	Write image(s) to DVD	FSC	Interchange
	STD-US-ID-MF-DVD	Write image(s) to DVD	FSC	Interchange

The following table presents an overview of the defined Photometric Interpretation and Transfer Syntax pairs for the Ultrasound Application Profiles (STD-US-xx-SF/MF...).

Table 170: Defined Photometric Interpretation and Transfer Syntax Pairs

Photometric Interpretation Value	Transfer Syntax Name	Transfer Syntax UID
MONOCHROME2	ELE	1.2.840.10008.1.2.1
	RLE	1.2.840.10008.1.2.5
RGB	ELE	1.2.840.10008.1.2.1
	RLE	1.2.840.10008.1.2.5
PALETTE COLOR	ELE	1.2.840.10008.1.2.1
	RLE	1.2.840.10008.1.2.5
YBR_FULL	RLE	1.2.840.10008.1.2.5
YBR_FULL_422	ELE	1.2.840.10008.1.2.1
	JPEG Lossy Baseline	1.2.840.10008.1.2.4.50
YBR_PARTIAL_422	ELE	1.2.840.10008.1.2.1
	JPEG Lossy Baseline	1.2.840.10008.1.2.4.50

5.2.1.2.2.1.1. Options

In the DICOMDIR file a Basic Directory IOD is present, containing PATIENT, STUDY, SERIES and IMAGE directory record types.

The DICOM standard specifies certain attributes of the DICOMDIR as mandatory.

However, these attributes may not be mandatory for the related SOP class IOD. For those attributes the following default values apply.

Table 171: Default Values in DICOMDIR

Attribute Name	Tag	VR	Notes
Study Date	0008,0020	DA	"17770101"
Study Time	0008,0030	TM	"00000"
Modality	0008,0060	CS	"OT"
Patient ID	0010,0020	LO	"UNKNOWN"
Study ID	0020,0010	SH	"UNKNOWN"
Series Number	0020,0011	IS	-1
Instance Number	0020,0013	IS	-1

Note that the STD-US, and STD-GEN, application profiles allow additional data elements at each directory level (ref. [DICOM] PS 3.11 Annex). In that context the optional attributes only apply to the STD-XABC and STD-XA1K application profiles.

The following tables describe the optional directory keys of the Media AE.

Table 172: Optional Keys

Attribute name	Tag	VR	Notes
Patient Keys			
Patient's Birth Date	0010,0030	DA	Explicit additional DICOMDIR key for Application Profiles STD-XABC-CD and STD-XA1K-CD (VT=2).
Patient's Sex	0010,0040	CS	Explicit additional DICOMDIR key for Application Profiles STD-XABC-CD and STD-XA1K-CD (VT=2).
Study Keys			
Referring Physician's Name	0008,0090	PN	-
Named of Physician Reading Study	0008,1060	PN	-
Series Keys			
Series Date	0008,0021	DA	-
Series Time	0008,0031	TM	-
Institution Name	0008,0080	LO	Implicit additional DICOMDIR key for STD-US, and STD-GEN, Application Profiles. Explicit additional DICOMDIR key for Application Profiles STD-XABC-CD and STD-XA1K-CD (VT=2).
Institution Address	0008,0081	ST	Implicit additional DICOMDIR key for STD-US, and STD-GEN, Application Profiles. Explicit additional DICOMDIR key for Application Profiles STD-XABC-CD and STD-XA1K-CD (VT=2).
Series Description	0008,103E	LO	-
Performing Physician's Name	0008,1050	PN	Explicit additional DICOMDIR key for Application Profiles STD-XABC-CD and STD-XA1K-CD (VT=2).
Body Part Examined	0018,0015	CS	-
Protocol Name	0018,1030	LO	-
Image Keys			
Image Type	0008,0008	CS	Explicit additional DICOMDIR key for Application Profiles STD-XABC-CD, STD-XA1K-CD and STD-GEN-CD (VT=1).
Content Date	0008,0023	DA	-
Content Time	0008,0033	TM	-

5.2.1.2.3. RWA - Update File-set

This Media Application Entity has a File-set Updater functionality which is described here.

For Real World Activities DICOM Reading, the Media AE will act as an FSU using the Interchange option when reading the directory of the medium and when reading the requested images.

5.2.1.2.3.1. Media Storage Application Profile

See table below for an overview of the support of the Application Profiles.

Table 173: Supported Application Profiles

Application Profile	Identifier	Real World Activity	Role	SC Option
CT/MR Studies on CD-R	STD-CTMR-CD	Read/Write image(s) from/to CD-R	FSU	Interchange
General Purpose CD-R Interchange	STD_GEN-CD	Read/Write image(s) from/to CD-R	FSU	Interchange
Basic cardiac X-Ray Angiographic Studies on CD-R media	STD-XABC-CD	Read/Write image(s) from/to CD-R	FSU	Interchange
1024 X-Ray Angiographic Studies on CD-R Media	STD-XA1K-CD	Read/Write image(s) from/to CD-R	FSU	Interchange
Image Display (Ultrasound {SF MF})	STD-US-ID-MF-CDR	Read/Write image(s) from/to CD-R	FSU	Interchange
	STD-US-ID-SF-CDR	Read/Write image(s) from/to CD-R	FSU	Interchange

Note: For DVD+RW and DVD-RW, it is not possible to support File Set Updation (FSU), because data on the media will be overwritten. A warning will be displayed on the user interface.

Exceptions:

- Less than 25MB of free space is available on the CD: in this case the Xcelera system will notify the user through an error message and will request another CD to be inserted. Nothing will be recorded on the CD with limited free space.
- Not enough disk space is available to create the CD image. In this case, the writing process is aborted and the user is notified about the problem through an error message.
- Studies and additional files do not fit on a single CD. The Xcelera system will request an additional CD after filling the first one. The writing operation shall only be aborted
- No CD inserted into CD recorder or 'closed'/corrupt CD in CD-recorder. The system will report these errors.
- One or more of the studies selected for writing to CD consist (partly) of lossy compressed data. The system will notify the user of this, providing the option to cancel the operation. If the clinical user decides to create the CD anyway, a disclaimer text file will be added to the CD, indicating that the CD contains lossy compressed data.
- JPEG or RLE images of selected studies do not contain Basic Offset Table. The system will add such a table.
- Images of selected studies contain a format (DICOM SOP class) that is not supported by the viewing functions of the Inturis Suite viewer workspot. These images will be written to CD as a DICOM media file but only if no transfer syntax conversion is required, i.e. if they are stored on the system in ELE or JPEG non-hierarchical 14

format. If such a conversion is required, the clinical user will be notified, and no CD is written.

- The use case Merge Patients on CD was performed and there is not enough free space on the CD to add the new studies and additional files. In this case the Xcelera system will immediately request an empty CD, without adding any studies to the existing CD.

5.2.1.2.3.1.1. Options

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 174: Supported DICOM Character Sets

Character Set Description	Defined Term	ESC Sequence	ISO Registration Number	Code Element	Character Set
Latin alphabet No. 1	ISO 2022 IR 100	ESC 02/08 04/02	ISO-IR 6	G0	ISO 646
		ESC 02/13 04/01	ISO-IR 100	G1	Supplementary set of ISO 8859
Japanese	ISO 2022 IR 13	ESC 02/08 04/10	ISO-IR 14	G0	JIS X 0201: Romaji
		ESC 02/09 04/09	ISO-IR 13	G1	JIS X 0201: Katakana
Japanese	ISO 2022 IR 159	-	ISO-IR 159	G0	JIS X 0212: Supplementary Kanji set
		-	-	-	-
Japanese	ISO 2022 IR 87	-	ISO-IR 87	G0	JIS X 0208: Kanji
		-	-	-	-
Latin alphabet No. 1	ISO_IR 100	-	ISO-IR 6	G0	ISO 646
		-	ISO-IR 100	G1	Supplementary set of ISO 8859

Notes:

A PN type attribute containing Japanese characters can contain three component groups in the following format.

<Single byte character>=<Ideographic character>=<Phonetic character>

Behavior of Xcelera during DICOM data import as SCP

When Xcelera imports DICOM data with PN type attributes with the above three component groups, then it uses the <Single byte character> component group for store in the internal data base.

In case <Single byte character> group is absent, then it uses <Ideographic character> group for store in the internal database

In case if both <Single byte character> and <Ideographic character> group are absent, then it uses <phonetic character> group for store in the internal database.

Behavior of Xcelera during DICOM data export as SCU

When Xcelera exports DICOM data, it uses the internally stored character group while exporting the PN type attributes.

That means if <Single byte character> group is internally saved, then that is used for export and other two component groups are not exported.

And if the <Ideographic character> group is internally saved, then that is used for export and other two component groups are not exported.

And if the <Phonetic character> group is internally saved, then that is used for export and the other two component groups are not exported.

7. SECURITY

7.1. Security Profiles

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

No instances of the Encrypted Attributes Data Set are created. No Transfer Syntaxes are supported for encoding/decoding of Encrypted Attributes Data Sets.

The table below lists the protected attributes when user selects anonymization of a patient record. The terms used to describe the replacement value can be read as below

Empty: The attribute will have a value of zero length.

User editable: The user can enter / edit the value for the attribute

User selectable: The user can select a predefined list of values for the attribute.

System: The system changeable.

Table 175: Basic Application Level Confidentiality Profile Attributes

Attribute Name	Tag	VR	Replacement Value	Remarks
Patient's Name	0010,0010	PN	Empty / User editable	Free editable
Patient's Birth Date	0010,0030	DA	Empty / User editable	Free editable
Patient's Sex	0010,0040	CS	Empty / User editable	Possible values F, M, O
Patient's Age	0010,1010	AS	Empty / User editable	Free editable
Patient ID	0010,0020	LO	Empty / User editable	Free editable
Referring Physician's Name	0008,0090	PN	Empty / User editable	Free editable
Performing Physician's Name	0008,1050	PN	Empty / User editable	Free editable
Institution Name	0008,0080	LO	Empty / User editable	Possible values "Default Institution", "DICOM"

Attribute Name	Tag	VR	Replacement Value	Remarks
Study ID	0020, 0010	SH	Empty / User editable	Free editable
Accession Number	0008,0050	SH	Empty / User editable	Free editable
Study Instance UID	0020, 000D	UI	System	System automatically changes during anonymization
Series Instance UID	0020, 000E	UI	Syste	System automatically changes during anonymization

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 "CATH ANALYSIS PACKAGE"

8.1. IOD Contents

8.1.1. Created SOP Instance

This section specifies each IOD created by this application.

Notes:

SOP classes created by CAAS2000 for Xcelera R3.1L1 are encoded with transfer syntax DICOM Implicit VR Little Endian (1.2.840.10008.1.2). No private tags are included in the derived objects so no loss of information.

Structured Reporting is supported by this version of CAAS2000 but this functionality is disabled for Xcelera R3.1L1.

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 176: List of created SOP Classes

SOP Class Name	SOP Class UID
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7

8.1.1.2. Secondary Capture Image Storage SOP Class

Table 177: IOD of Created Secondary Capture Image Storage SOP Class Instances

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

Table 178: Patient Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Issuer of Patient ID	0010,0021	LO		ANAP	COPY	If Issuer of Patient ID is not present in the imported object, then "Default Institution" will be put by Xcelera 3.1.
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		VNAP	COPY	

Table 179: 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 180: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Performing Physician's Name	0008,1050	PN		ANAP	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		VNAP	AUTO	

Table 181: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips Medical System	ALWAYS	AUTO	

Table 182: 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	OT	ANAP	AUTO	

Table 183: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Image Type	0008,0008	CS	Value 1: DERIVED, Value 2: SECONDARY	ALWAYS	AUTO	
Instance Number	0020,0013	IS		VNAP	AUTO	
Patient Orientation	0020,0020	CS		ANAPCV	AUTO	

Table 184: Image Pixel Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Bits Allocated	0028,0100	US		ALWAYS	AUTO	
Bits Stored	0028,0101	US		ALWAYS	AUTO	
Columns	0028,0011	US		ALWAYS	AUTO	
High Bit	0028,0102	US		ALWAYS	AUTO	
Photometric Interpretation	0028,0004	CS		ALWAYS	AUTO	
Pixel Aspect Ratio	0028,0034	IS		ANAPEV	AUTO	
Pixel Data	7FE0,0010	O W/ OB		ALWAYS	AUTO	
Pixel Representation	0028,0103	US		ALWAYS	AUTO	
Rows	0028,0010	US		ALWAYS	AUTO	
Samples per Pixel	0028,0002	US		ALWAYS	AUTO	

Table 185: VOI LUT Module

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

Table 186: 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	ISO_IR 100	ALWAYS	AUTO	

8.1.2. Usage of Attributes from Received IOD

The following table lists the functionality supported by this application.

Table 187: Functionalities

Functionality	Type1	Optional	Private
CAAS 2000	X		

8.1.2.1. Usage of the Functionality CAAS 2000

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

Table 188: Supported SOP Classes for functionality CAAS 2000

SOP Class name	SOP Class UID
X-Ray Angiographic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2

Notes:

The SOP classes mentioned above are supported by CAAS2000 for Xcelera R3.1L1 with transfer syntaxes DICOM Implicit VR Little Endian (1.2.840.10008.1.2), DICOM Explicit VR Little Endian (1.2.840.10008.1.2.1) and DICOM Explicit JPEG Lossless Image Compression (1.2.840.10008.1.2.4.70).

Pixel Intensity Relationship (0028,1040) = "DRM" or "SQRT" (e.g. GE Innova) are supported by CAAS2000 for Xcelera R3.1L1 additionally to the values "LIN", "LOG" and "DISP".

Matrix size Rows (0028,0010) and Columns (0028,0011) with a minimum of 8 pixels and a maximum of 2048 pixels are supported by CAAS2000 for Xcelera R3.1L1.

8.1.3. Attribute Mapping

Not applicable.

8.1.4. Coerced/Modified fields

Not applicable.

8.2. Data Dictionary of Private Attributes

Not applicable.

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

Not applicable.

8.5. Standard Extended/Specialized/Private SOPs

Not applicable.

8.6. Private Transfer Syntaxes

Not applicable.

9. ANNEXES OF APPLICATION "NM VIEWER"

9.1. IOD Contents

9.1.1. Created SOP Instance

This section specifies each IOD created by this application.

Note:

The SOP classes created by AutoQuant for Xcelera R3.1L1 are encoded with transfer syntax DICOM Explicit VR Little Endian (1.2.840.10008.1.2.1) only. Transfer syntax DICOM RLE Lossless (1.2.840.10008.1.2.5) is offered for creation but non-functional in this build.

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 189: 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

9.1.1.2. Secondary Capture Image Storage SOP Class

Table 190: IOD of Created Secondary Capture Image Storage SOP Class Instances

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

Table 191: 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		VNAP	COPY	

Table 192: 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 Description	0008,1030	LO		ANAP	COPY	
Study ID	0020,0010	SH		VNAP	COPY	
Study Instance UID	0020,000D	UI		ALWAYS	COPY	
Study Time	0008,0030	TM		VNAP	COPY	

Table 193: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA		ANAP	AUTO	
Series Description	0008,103E	LO		ANAP	AUTO	
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		VNAP	AUTO	
Series Time	0008,0031	TM		ANAP	AUTO	

Table 194: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO		VNAP	COPY	
Manufacturer's Model Name	0008,1090	LO		ANAP	AUTO	
Software Version(s)	0018,1020	LO	Value 1: AIM_DICOM_200	ANAP	AUTO	
Station Name	0008,1010	SH		ANAP	AUTO	

Table 195: SC Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Conversion Type	0008,0064	CS	WSD	ALWAYS	AUTO	
Digital Image Format Acquired	0018,1023	LO		ANAP	AUTO	
Modality	0008,0060	CS	NM	ALWAYS	AUTO	
Secondary Capture Device Manufacturer	0018,1016	LO		ANAP	AUTO	
Secondary Capture Device Manufacturer's Model Name	0018,1018	LO		ANAP	AUTO	
Secondary Capture Device Software Version(s)	0018,1019	LO		ANAP	AUTO	

Table 196: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Acquisition Date	0008,0022	DA		ANAP	COPY	
Acquisition Number	0020,0012	IS		ANAP	COPY	
Acquisition Time	0008,0032	TM		ANAP	COPY	
Content Date	0008,0023	DA		ANAPCV	COPY	
Content Time	0008,0033	TM		ANAPCV	COPY	
Derivation Description	0008,2111	ST		ANAP	AUTO	
Image Type	0008,0008	CS		ANAP	AUTO	
Instance Number	0020,0013	IS		VNAP	COPY	
Patient Orientation	0020,0020	CS		ANAPCV		

Table 197: Image Pixel Module

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

Table 198: SC Image Module

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

Table 199: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Instance Creation Date	0008,0012	DA		ANAP	AUTO	
Instance Creation Time	0008,0013	TM		ANAP	AUTO	
SOP Class UID	0008,0016	UI		ANAPEV	AUTO	
SOP Instance UID	0008,0018	UI		ANAPEV	AUTO	
Specific Character Set	0008,0005	CS		ANAPEV	AUTO	

9.1.2. Usage of Attributes from Received IOD

The following table lists the functionality supported by this application.

Table 200: Functionalities

Functionality	Type1	Optional	Private
AutoQuant	X		X

9.1.2.1. Usage of the Functionality AutoQuant

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

Table 201: Supported SOP Classes for functionality AutoQuant

SOP Class name	SOP Class UID
Nuclear Medicine Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.20
Secondary Capture Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7

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

Not applicable.

9.5. Standard Extended/Specialized/Private SOPs

Not applicable.

9.6. Private Transfer Syntaxes

Not applicable.

10. ANNEXES OF APPLICATION "ULTRASOUND ANALYSIS PACKAGE"

10.1. IOD Contents

10.1.1. Created SOP Instance

This section specifies each IOD created by this application.

Notes:

The Ultrasound Image Storage SOP Class is created by Qlab for Xcelera R3.1L1 with transfer syntax DICOM Explicit JPEG baseline Lossy compression (1.2.840.10008.1.2.4.50).

The Comprehensive SR SOP Class is created by Qlab for Xcelera R3.1L1 with transfer syntax DICOM Explicit Little Endian (1.2.840.10008.1.2.1).

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

10.1.1.1. List of created SOP Classes

Table 202: List of created SOP Classes

SOP Class Name	SOP Class UID
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1

10.1.1.2. Comprehensive SR SOP Class

Table 203: IOD of Created Comprehensive SR SOP Class Instances

Information Entity	Module	Presence Of Module
Patient	Patient Module	
Study	General Study Module	
Series	SR Document Series Module	
Equipment	General Equipment Module	
Document	SR Document General Module	
	Additional Module	

Table 204: Patient Module

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

Table 205: General Study Module

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

Table 206: SR Document Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS	SR	ALWAYS		
Series Instance UID	0020,000E	UI		ALWAYS		
Series Number	0020,0011	IS		ALWAYS		
Referenced Performed Procedure Step Sequence	0008,1111	SQ		VNAP		
>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		

Table 207: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips Medical System	VNAP		
Manufacturer's Model Name	0008,1090	LO	QLAB	ANAPCV		
Software Version(s)	0018,1020	LO		ANAPCV		

Table 208: SR Document General Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Completion Flag	0040,A491	CS		ALWAYS		
Content Date	0008,0023	DA		ALWAYS		
Content Time	0008,0033	TM		ALWAYS		
Instance Number	0020,0013	IS		ALWAYS		
Verification Flag	0040,A493	CS		ALWAYS		
Performed Procedure Code Sequence	0040,A372	SQ		VNAP		
>Code Meaning	0008,0104	LO		ALWAYS		
>Code Value	0008,0100	SH		ALWAYS		
>Coding Scheme Designator	0008,0102	SH		ALWAYS		

Table 209: Additional Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Series Date	0008,0021	DA				
Series Time	0008,0031	TM				
Study Description	0008,1030	LO				
Series Description	0008,103E	LO				

10.1.1.3. Ultrasound Image Storage SOP Class**Table 210: IOD of Created Ultrasound Image Storage SOP Class Instances**

Information Entity	Module	Presence Of Module
Patient	Patient Module	
Study	General Study Module	
Series	General Series Module	
Equipment	General Equipment Module	
Image	General Image Module	
Image	Image Pixel Module	
Image	US Image Module	
Image	VOI LUT Module	
Image	SOP Common Module	
	Additional Module	

Table 211: Patient Module

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

Table 212: General Study Module

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

Table 213: General Series Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Modality	0008,0060	CS		ALWAYS	AUTO	
Protocol Name	0018,1030	LO		ANAP	AUTO	
Series Date	0008,0021	DA		ANAP	AUTO	
Series Description	0008,103E	LO		ANAPCV		
Series Instance UID	0020,000E	UI		ALWAYS	AUTO	
Series Number	0020,0011	IS		VNAP	AUTO	
Series Time	0008,0031	TM		ANAP	AUTO	

Table 214: General Equipment Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Manufacturer	0008,0070	LO	Philips Medical System	VNAP	AUTO	
Manufacturer's Model Name	0008,1090	LO	QLAB	ANAP	AUTO	
Software Version(s)	0018,1020	LO		ANAP	AUTO	

Table 215: General Image Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Burned In Annotation	0028,0301	CS		ANAP	AUTO	
Content Date	0008,0023	DA		ANAPCV	AUTO	
Content Time	0008,0033	TM		ANAPCV	AUTO	
Derivation Description	0008,2111	ST	QLab Clip	ANAP	AUTO	
Instance Number	0020,0013	IS		VNAP	AUTO	
Lossy Image Compression Ratio	0028,2112	DS		ANAP	AUTO	
Source Image Sequence	0008,2112	SQ		ANAP	AUTO	
>Referenced SOP Class UID	0008,1150	UI		ALWAYS		
>Referenced SOP Instance UID	0008,1155	UI		ALWAYS		

Table 216: Image Pixel Module

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

Table 217: US Image 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	
High Bit	0028,0102	US	7	ALWAYS	AUTO	
Image Type	0008,0008	CS	Value 1: DERIVED, Value 2: SECONDARY	VNAP	AUTO	
Lossy Image Compression	0028,2110	CS	01	ANAP	AUTO	
Photometric Interpretation	0028,0004	CS	YBR_FULL_422	ALWAYS	AUTO	
Pixel Representation	0028,0103	US	0	ALWAYS	AUTO	
Planar Configuration	0028,0006	US		ANAP		
Samples per Pixel	0028,0002	US	3	ALWAYS	AUTO	

Table 218: VOI LUT Module

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

Table 219: SOP Common Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
SOP Class UID	0008,0016	UI	1.2.840.10008.5.1.4.1.1.6.1	ALWAYS	AUTO	
SOP Instance UID	0008,0018	UI		ALWAYS	AUTO	
Specific Character Set	0008,0005	CS	ISO_IR 100	ANAP	AUTO	

Table 220: Additional Module

Attribute Name	Tag	VR	Value	Presence of Value	Source	Comment
Conversion Type	0008,0064	CS	SYN	ALWAYS	AUTO	

10.1.2. Usage of Attributes from Received IOD

The following table lists the functionality supported by this application.

Table 221: Functionalities

Functionality	Type1	Optional	Private
QLab	X		

10.1.2.1. Usage of the Functionality QLab

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

Table 222: Supported SOP Classes for functionality QLab

SOP Class name	SOP Class UID
Comprehensive SR SOP Class	1.2.840.10008.5.1.4.1.1.88.33
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multi-frame Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.3.1

10.1.3. Attribute Mapping

Not applicable.

10.1.4. Coerced/Modified fields

Not applicable.

10.2. Data Dictionary of Private Attributes

Not applicable.

10.3. Coded Terminology and Templates

Adult Echocardiography Structured Report is based on the Template ID 5200.

10.3.1. Context Groups

Not applicable.

10.3.2. Template Specifications

Not applicable.

10.3.3. Private code definitions

Not applicable.

10.4. Grayscale Image consistency

Not applicable.

10.5. Standard Extended/Specialized/Private SOPs

Not applicable.

10.6. Private Transfer Syntaxes

Not applicable.