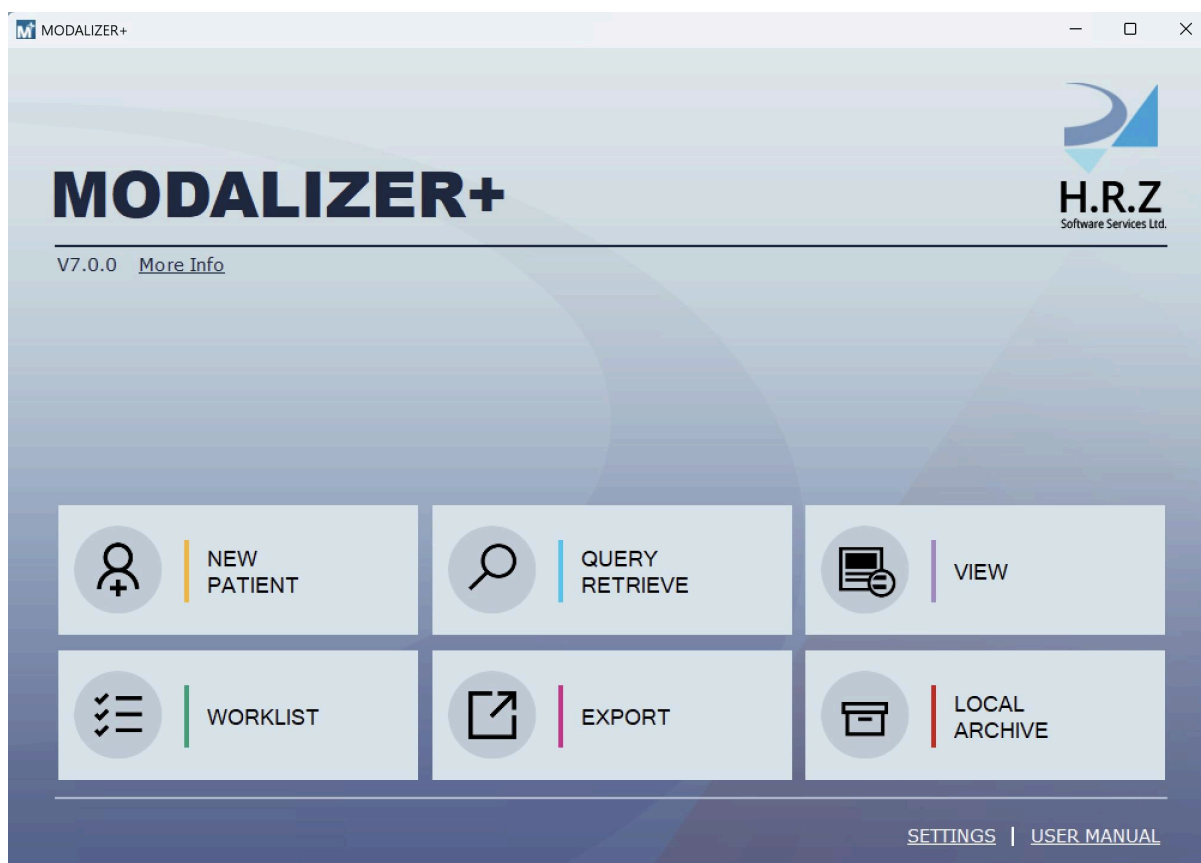


MODALIZER+

DICOM Conformance Statement – Version 7.0

Healthcare Imaging Workflow Wizard



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Revision History

Revision	Date	Author	Comments
5	February 16, 2026	Roni Zaharia	Updates of version 7.0
4	March 6, 2023	Roni Zaharia	Updates of version 6.1
3	March 16, 2021	Roni Zaharia	Updates of version 6.0
2	December 13, 2018	Roni Zaharia	Updates of version 5.5
1	December 31, 2015	Roni Zaharia	First published version

Reference Documents

Title	Date	Link
MODALIZER+ V 7.0.0 User's Manual	February 16, 2026	https://downloads.hrzkit.com/MODALIZER+/7.0.0/
The DICOM Standard, DICOM PS3.1 2026a	February 16, 2026	https://www.dicomstandard.org/current
MODALIZER+ Web Site	February 16, 2026	https://www.dicomizer.com



1 Overview

MODALIZER+ is a powerful and easy-to-use Point-of-Care Imaging and Reporting tool. It was carefully designed to capture, scan and display Images and documents in PACS Environment. MODALIZER+ provides a complete solution for Healthcare personnel to document patient encounter and perform other related tasks. MODALIZER+ is a state of the art DICOM Application with a rich feature set combining Imaging Modality, Reporting Tool, DICOM Viewer and Conversion Tool.

Table 1-2 below outlines the DICOM Network and Media services that MODALIZER+ supports.

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Verification:	Yes	Yes
Query/Retrieve:		
Study Root Information Model FIND	Yes	No
Study Root Information Model MOVE	Yes	No
Study Root Information Model GET	Yes	No
Transfer:		
Storage (see Table 3-6: Storage SOP Classes)	Yes	Yes
Storage Commitment Push Model	Yes	No
Worklist Management:		
Modality Worklist Information Model - FIND	Yes	No
Modality Performed Procedure Step	Yes	No

TABLE 1-1 NETWORK SERVICES

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
USB flash drive, CD-R, DVD	Yes	Yes

TABLE 1-2 MEDIA SERVICES

MODALIZER+ supports BCP 195 TLS Secure Transport Connection Profile.



2 Introduction

2.1 General Information

MODALIZER+ provides a wide set of features and services for different use cases. For a complete list of MODALIZER+ capabilities please refer to the MODALIZER+ user's manual.

2.2 Audience

This document is intended for hospital technical health system integrators. It is assumed that the reader has a working understanding of DICOM.

2.3 Definitions, Terms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard. Abbreviations and terms are as follows:

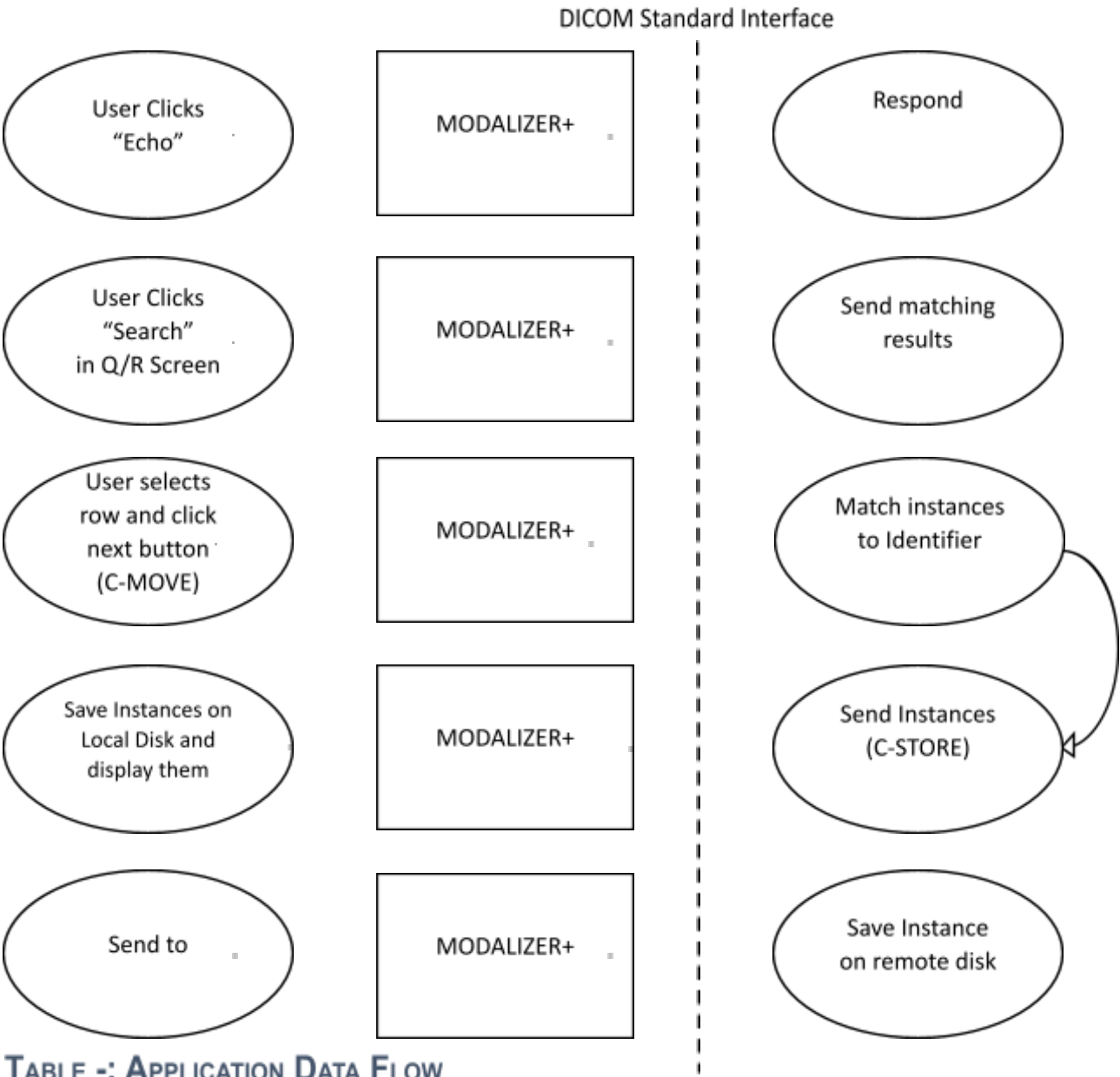
AE	DICOM Application Entity
AET	Application Entity Title
ASCE	Association Control Service Element
CD-R	Compact Disk Recordable
CSE	Customer Service Engineer
DVD	Digital Video Disk
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
IOD	(DICOM) Information Object Definition
ISO	International Standard Organization
J2K	Jpeg 2000
PACS	Picture Archive and Communication System
PDU	DICOM Protocol Data Unit
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM server)
SOP	DICOM Service-Object Pair
TLS	Transport Layer Security
USB	Universal Serial Bus
UVC	Universal Video Class
R	Required Key Attribute
O	Optional Key Attribute
U	Unique Key Attribute

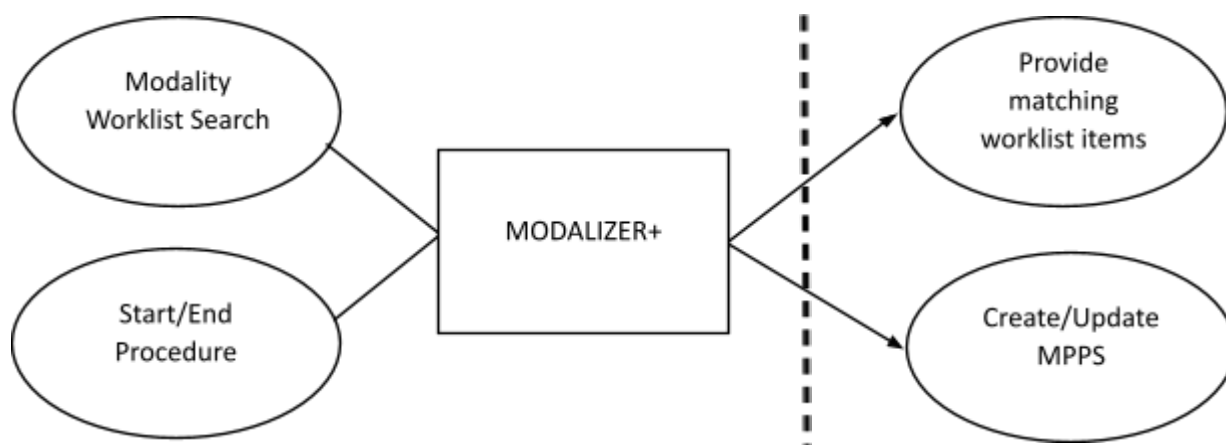


3 Networking

3.1 Implementation Model

3.1.1 Application Data Flow



**TABLE 3-2 APPLICATION DATA FLOW (CONTINUED)**

MODALIZER+ includes the Verification SCU, Q/R SCU (including Storage SCP), Storage SCU and Worklist SCU

- Verification SCU (C-ECHO): Each of the “Echo” buttons in the settings screen starts a verification process during which an association is established and the C-ECHO command is performed. The Echo button inside the DICOM Listener expander is used to verify the connection to MODALIZER+ itself in order to make sure that MODALIZER+ is ready to receive incoming associations. A log file named “lastEcho.log” logs the last verification process.
- MODALIZER+ Q/R SCU is implemented in the QUERY/RETRIEVE screen. It enables searching for studies and retrieving them for display. Once retrieved, the user can also add images and other objects to the existing study.
- The Storage SCP is provided for use together with the Q/R SCU. When the *Local Archive* is enabled, the Storage SCP serve unsolicited storage requests as well (AKA ‘DICOM PUSH’).
- Storage SCU: MODALIZER+ can store the instances it creates as well as imported instances on remote DICOM Application Entities using the Storage SCU Service Class. The Store operation is available at the end of every procedure as well as from the viewer screen and from the local archive.
- Worklist SCU: MODALIZER+ Worklist SCU enables scheduled workflow where the patient and case information parameters are retrieved from a Worklist Server. The Worklist SCU performs searches using a Modality Worklist Query and updates the study status using Modality Performed Procedure Step (IN PROGRESS/COMPLETED/DISCONTINUED).



3.1.2 Functional Definition of AE's

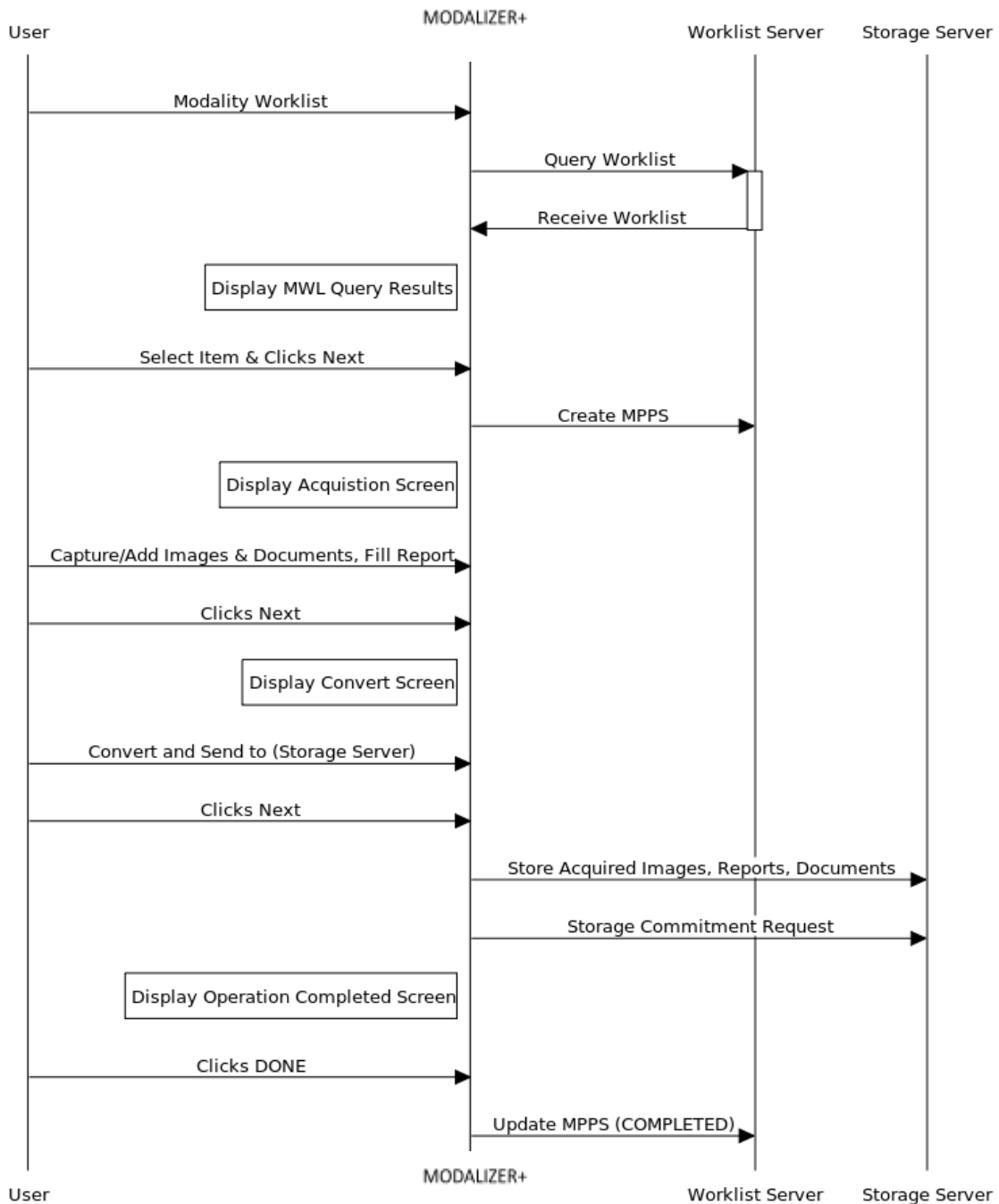
3.1.2.1 MODALIZER+

MODALIZER+ runs a standalone windows applications. The user interacts with MODALIZER+ using the Graphical User Interface (GUI) to perform different tasks.

3.1.2.2 Sequencing of Real World Activities

3.1.2.2.1 Modality Worklist Sequence

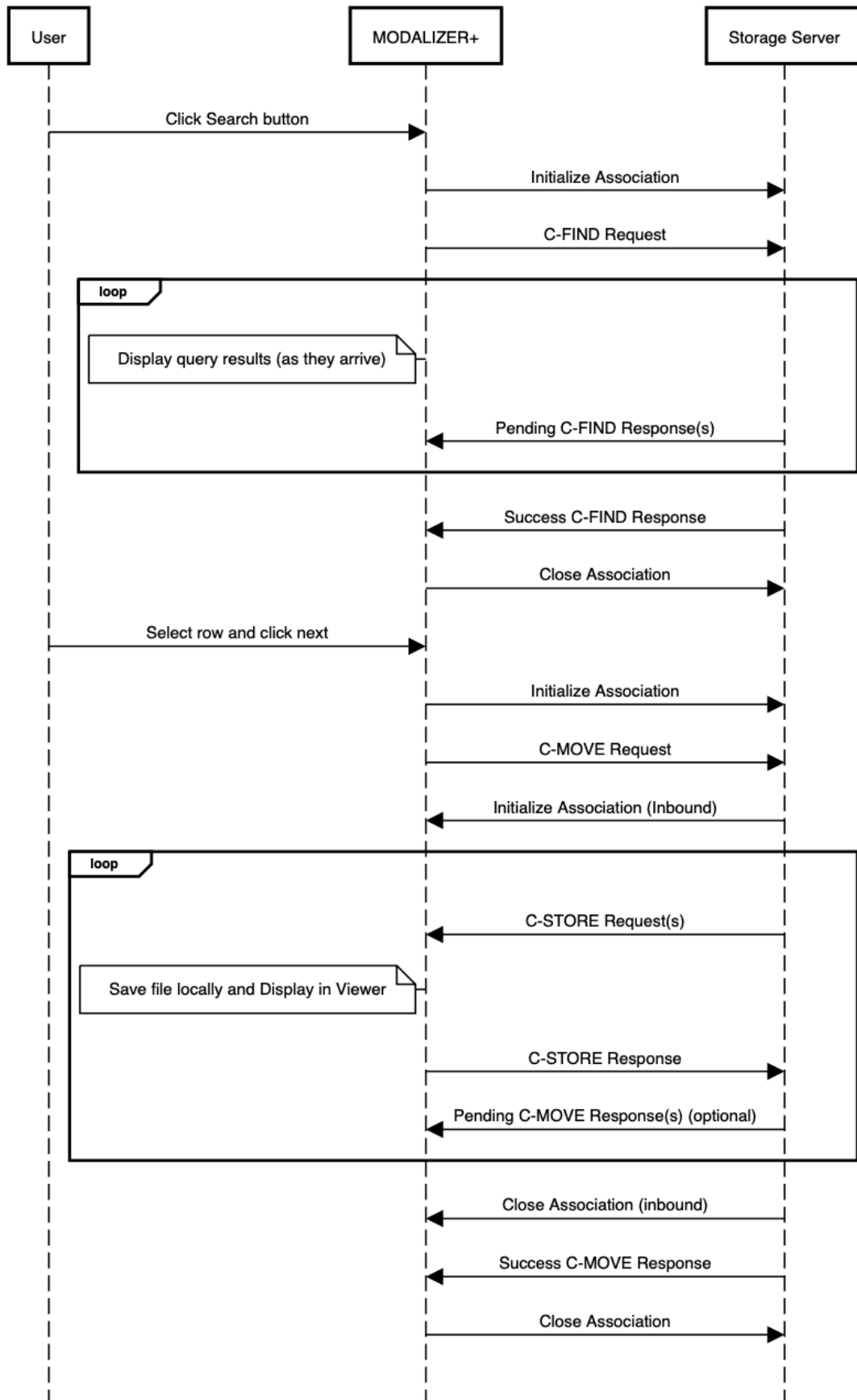
Modality Worklist Sequence





3.1.2.2.2 Query Retrieve Sequence (C-MOVE option)

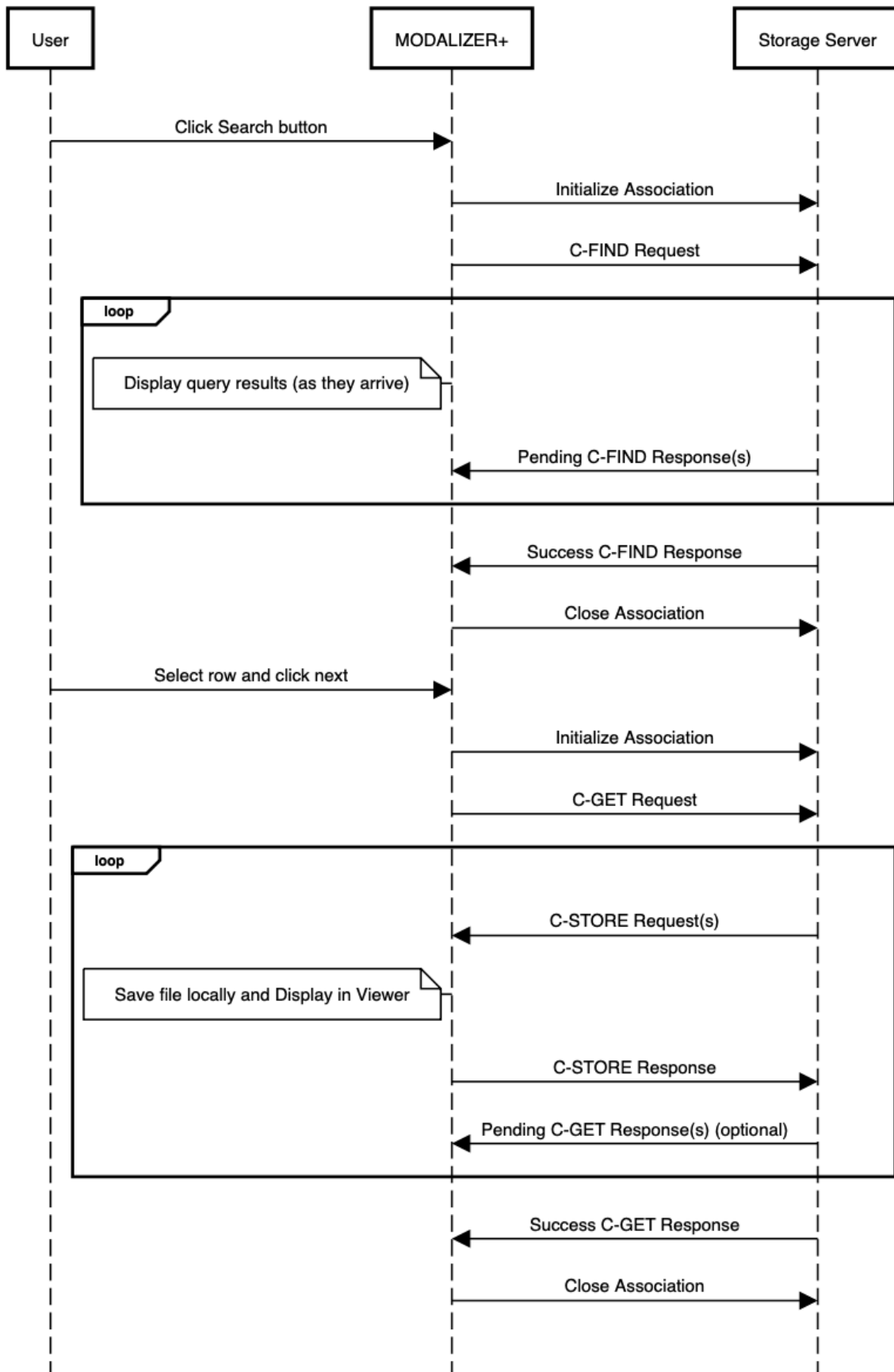
Query/Retrieve Sequence (C-MOVE option)





3.1.2.2.3 Query Retrieve Sequence (C-GET option)

Query/Retrieve Sequence (C-GET option)





3.2 AE Specifications

3.2.1 MODALIZER+ AE Specifications

3.2.1.1 SOP Classes

MODALIZER+ provides Standard Conformance to the following SOP Classes for Verification:

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	Yes

TABLE 3-3: VERIFICATION SOP CLASSES

Note: Make sure to turn on the DICOM Listener in the settings screen before attempting verification from other applications.

MODALIZER+ provides Standard Conformance to the following SOP Classes for Q/R:

SOP Class Name	SOP Class UID	SCU	SCP
Study Root Q/R Find	1.2.840.10008.5.1.4.1.2.2.1	Yes	No
Study Root Q/R Move	1.2.840.10008.5.1.4.1.2.2.2	Yes	No
Study Root Q/R Get	1.2.840.10008.5.1.4.1.2.2.3		

TABLE 3-4: Q/R SOP CLASSES

MODALIZER+ provides Standard Conformance to the following SOP Classes for Worklist Management:

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model Find	1.2.840.10008.5.1.4.31	Yes	No
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No

MODALIZER+ provides Standard Conformance to the following SOP Classes for Storage Commitment:

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

TABLE 3-5: STORAGE COMMITMENT SOP CLASSES

MODALIZER+ provides Standard Conformance to the following SOP Classes for Storage as **SCU** and as **SCP**:

SOP Class Name	SOP Class UID
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65
Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.2
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
(DRAFT) SR Audio Storage	1.2.840.10008.5.1.4.1.1.88.2
(DRAFT) SR Comprehensive Storage	1.2.840.10008.5.1.4.1.1.88.4
(DRAFT) SR Detail Storage	1.2.840.10008.5.1.4.1.1.88.3
(DRAFT) SR Text Storage	1.2.840.10008.5.1.4.1.1.88.1



(DRAFT) Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1
Digital Intra Oral X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra Oral X-Ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Digital Mammography X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital X-Ray Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2
Mammography CADS R	1.2.840.10008.5.1.4.1.1.88.50
Multiframe Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multiframe Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multiframe Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ophthalmic Photography16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2
Ophthalmic Photography8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1
PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
PET Image Storage	1.2.840.10008.5.1.4.1.1.128
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40
Pseudo Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.3
(RETIRED) Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.5
(RETIRED) Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6
(RETIRED) Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3
(RETIRED) VL Image Storage	1.2.840.10008.5.1.4.1.1.77.1
(RETIRED) VL Multi Frame Image Storage	1.2.840.10008.5.1.4.1.1.77.2
(RETIRED) X-Ray Angiographic Bi Plane Image Storage	1.2.840.10008.5.1.4.1.1.12.3
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1



RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Standalone VOILUT Storage	1.2.840.10008.5.1.4.1.1.11
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3
Stored Print Storage	1.2.840.10008.5.1.1.27
Twelve Lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Fluoroscopy Image Storage	1.2.840.10008.5.1.4.1.1.12.2
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67
GE Collage Storage	1.2.528.1.1001.5.1.1.1
GEPrivateDICOMRTPlanStorage	1.2.840.113619.4.5.249
GEeNTEGRASStorage	1.2.840.113619.4.27
GE3DModelImageStorage	1.2.840.113619.4.26
#define UID_GEPETAdvanceRawDataStorage	1.2.840.113619.4.30
GE Private Structure Display Storage	1.2.840.113619.4.41
Philips Live 3D 01 Storage	1.2.840.113543.6.6.1.3.10001
Philips Live 3D 02 Storage	1.2.840.113543.6.6.1.3.10002
Tomtec Annotation Private Storage	1.2.276.0.48.5.1.4.1.1.7
Philips Private Gyroscan MR Series Data Storage	1.3.46.670589.11.0.0.12.2
Philips Private Specialized X-Ray Storage	1.3.46.670589.2.3.1.1
Fuji Private CR Storage	1.2.392.200036.9125.1.1.2
Philips Private 3D Volume Storage	1.3.46.670589.5.0.1.1
Philips Private 3D Presentation State	1.3.46.670589.2.5.1.1

TABLE 3-6: STORAGE SOP CLASSES

3.2.1.2 Association Policies

3.2.1.2.1 General

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

**TABLE 3-7 DICOM APPLICATION CONTEXT****3.2.1.2.2 Number of Associations**

When the DICOM Listener is started in the settings screen, associations are accepted while the MODALIZER+ is running. If the DICOM Listener is disabled in the settings screen, associations are accepted only during a retrieve action (C-MOVE Command) issued from the Query/Retrieve screen.

MODALIZER+ accepts a single incoming association at a time.

Maximum number of simultaneous associations	1
---	---

TABLE 3-8 NUMBER OF ASSOCIATIONS AS ASSOCIATION INITIATOR

Maximum number of simultaneous associations	1
---	---

TABLE 3-9 NUMBER OF ASSOCIATIONS AS ASSOCIATION ACCEPTOR**3.2.1.2.3 Asynchronous Nature**

MODALIZER+ does not support multiple outstanding transactions.

3.2.1.2.4 Implementation Identifying Information

Implementation Class UID	2.16.124.113543.6021.1
Implementation Version Name	RZDCX_3_2_2_36

TABLE 3-10 DICOM IMPLEMENTATION CLASS UID AND VERSION NAME**3.2.1.3 Association Initiation Policies**

MODALIZER+ Verification SCU initiates an associations when the user clicks any of the Echo buttons in the settings screen.

3.2.1.3.1 Activity – Verify Connection with a remote AE**3.2.1.3.1.1 DESCRIPTION AND SEQUENCING OF EVENTS**

This activity is performed when the user clicks any of the “Echo” buttons in the configuration screen.

3.2.1.3.1.2 PRESENTATION CONTEXTS FOR VERIFICATION

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

TABLE 3-11 PRESENTATION CONTEXTS FOR QUERY**3.2.1.3.1.3 SOP SPECIFIC CONFORMANCE STATEMENT FOR VERIFICATION SOP CLASSES**

The following table summarizes the behavior in response to command statuses:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000H	Show a green success indicator next to the clicked button.
Other	Failure	Other than 0000H	Show a red failure indicator next to the clicked button.

TABLE 3-12 DICOM COMMAND RESPONSE STATUS HANDLING FOR VERIFICATION SOP CLASS

MODALIZER+ displays a success/failure indicator on the screen. In case of failure, an error message is displayed.

3.2.1.3.2 Activity – Query Studies**3.2.1.3.2.1 DESCRIPTION AND SEQUENCING OF EVENTS**

MODALIZER+ issues a C-FIND command when:



1. Entering the Query/Retrieve Screen and
2. when the user clicks the *Search* (marked below) button and
3. when the user changes the selected remote AE's dropdown (marked below)

MODALIZER+ initiates an association with the selected remote AE from the Remote AE's dropdown.

While the query is running, entries are added to the query results grid as they are received (from the C-FIND response messages with status pending). The *Search* button is replaced by a *Cancel* button which if clicked issues a C-CANCEL command and stops the query.

3.2.1.3.2.2 PRESENTATION CONTEXTS FOR QUERY

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Study Root Q/R Find	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

TABLE 3-13 PROPOSED PRESENTATION CONTEXTS FOR STUDY ROOT Q/R FIND SOP CLASS

3.2.1.3.2.3 SOP SPECIFIC CONFORMANCE STATEMENT FOR STUDY ROOT Q/R FIND SOP CLASS

The Query Retrieve Level is STUDY.

Extended negotiation is not supported.

Name	Tag	Source	Comment
Specific Character Set	(0008,0005)	Pre-defined	ISO_IR 100 or ISO_IR 192 (UTF8) depending on "Use unicode character set" flag in configuration.
Study Date	(0008,0020)	Filled by user	Date match, Range from/to (inside advanced search expander).
Study Time	(0008,0030)	Return Value	
Accession Number	(0008,0050)	Filled by user	Wildcards accepted. May not be supported by peer.
Q/R Level	(0008,0052)	"STUDY"	
Modalities in Study	(0008,0061)	Filled by user	
Referring Physician Name	(0008,0090)	Return Value	
Patient Name	(0010,0010)	Filled by user	
Patient ID	(0010,0020)	Filled by user	
Patient Birth Date	(0010,0030)	Filled by user	
Patient Sex	(0010,0040)	Filled by user	
Study Instance UID	(0020,000D)	Return Value	
Study ID	(0020,0010)	Return Value	
Number of study related series	(0020,1206)	Return Value	
Number of study related instance	(0020,1208)	Return Value	

TABLE 3-14: STUDY ROOT QUERY REQUEST ATTRIBUTES



The following table summarizes the behavior in response to command statuses:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000H	Show success indicator and display results
Pending	Matching continues	FF00H	Results are added to the display
Other	Failure	Any other status	Stop and display error message

TABLE 3-15 DICOM COMMAND RESPONSE STATUS HANDLING FOR STUDY ROOT Q/R FIND SOP CLASS

3.2.1.3.3 Activity – Retrieve Studies

3.2.1.3.3.1 DESCRIPTION AND SEQUENCING OF EVENTS

The user can set the “Retrieve Method” to C-MOVE (default) or C-GET for every configured Storage Server in the settings screen.

MODALIZER+ issues a C-MOVE or a C-GET command when:

1. The user double-clicks a query result row in the query results grid, or
2. When one of the rows in the query results grid is selected/highlighted and the user clicks the next button at the bottom of the screen.

The choice between C-MOVE and C-GET is configured in the settings screen.

Before starting the C-MOVE operation, if the DICOM Listener is not already started, MODALIZER+ starts the DICOM listener on the configured port in order to accept the incoming association carrying the matching instances. If the DICOM Listener is not configured to run constantly, then MODALIZER+ will turn the listener off at the end of the C-MOVE operation.

When the “Retrieve operation” is configured to C-GET, there’s no need to turn on the listener.

The Target AE Title attribute in the C-MOVE Request is the same as the Calling AE Title as configured in the settings screen.

The progress bar at the top of the screen is updated as pending responses are received.

3.2.1.3.3.2 PRESENTATION CONTEXTS FOR RETRIEVE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Study Root Q/R Move	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

TABLE 3-16 PROPOSED PRESENTATION CONTEXTS FOR STUDY ROOT Q/R MOVE SOP CLASS

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Study Root Q/R Get	1.2.840.10008.5.1.4.1.2.2.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

TABLE 3-17 PROPOSED PRESENTATION CONTEXTS FOR STUDY ROOT Q/R GET SOP CLASS



3.2.1.3.3.3 SOP SPECIFIC CONFORMANCE STATEMENT FOR STUDY ROOT Q/R MOVE SOP CLASS

Name	Tag	Value	Matching Type
Query Retrieve Level	(0008,0052)	STUDY	
Patient ID	(0010,0010)	Value from selected search result	Unique/Exact
Study Instance UID	(0020,000d)	Value from selected search result	Unique/Exact

TABLE 3-18 STUDY ROOT Q/R COMMAND IDENTIFIER

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000H	Display the retrieved Study
Pending	Matching continues	FF00H	Update the progress bar
Other	Failure	Any other status	Display error message

TABLE 3-19 DICOM COMMAND RESPONSE STATUS HANDLING FOR STUDY ROOT Q/R MOVE SOP CLASS

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000H	Display the retrieved Study
Other	Failure	Any other status	Display error message

TABLE 3-20 DICOM COMMAND RESPONSE STATUS HANDLING FOR STUDY ROOT Q/R GET SOP CLASS

3.2.1.3.4 Activity – Modality Worklist Query

3.2.1.3.4.1 DESCRIPTION AND SEQUENCING OF EVENTS

MODALIZER+ issues a Modality Worklist Query using the C-FIND command when:

4. Entering the Modality Worklist Screen and
5. when the user clicks the *Search* button and
6. when the user changes the selected remote AE's dropdown

MODALIZER+ initiates an association with the selected remote AE from the Remote AE's dropdown.

While the query is running, entries are added to the results grid as they are received (from the C-FIND response messages with status pending). The *Search* button is replaced by a *Cancel* button which if clicked issues a C-CANCEL command to request stopping of the query.

3.2.1.3.4.2 PRESENTATION CONTEXTS FOR MODALITY WORKLIST QUERY

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

TABLE 3-21 PROPOSED PRESENTATION CONTEXTS FOR MODALITY WORKLIST QUERY FIND SOP CLASS

3.2.1.3.4.3 SOP SPECIFIC CONFORMANCE STATEMENT FOR MODALITY WORKLIST QUERY FIND SOP CLASS

Extended negotiation is not supported.

Name	Tag	Source	Comment
Specific Character Set	(0008,0005)	Pre-defined	ISO_IR 100 or ISO_IR 192 (UTF8) depending on "Use unicode character set" flag in configuration.



Accession Number	(0008,0050)	Filled by user	Wildcards accepted. May not be supported by peer.
Referring Physicians Name	(0008,0090)	Return value	
Patient Name	(0010,0010)	Filled by user	Wildcards accepted. May not be supported by peer.
Patient ID	(0010,0020)	Filled by user	Wildcards accepted. May not be supported by peer.
Occupation	(0010,2108)	Filled by user	Wildcards accepted. May not be supported by peer.
Patient Birth Date	(0010,0030)	Return value	
Patient Sex	(0010,0040)	Return value	
Study Instance UID	(0020,000d)	Return value	
Requested Procedure Description	(0032,1060)	Return value	
Current Patient Location	(0038,0300)	Filled by user	Wildcards accepted. May not be supported by peer.
Scheduled Procedure Step Sequence	(0040,0100)		
>> Modality	(0008,0060)	Filled by user	Default query value can be set from settings screen
>> Scheduled Station AE Title	(0040,0001)	Filled by user	Default query value can be set from settings screen
>> Scheduled Procedure Step Start Date	(0040,0002)	Filled by user	Date, Range matching, Default query value can be set from settings screen
>> Scheduled Procedure Step Start Time	(0040,0003)	Return value	
>> Scheduled Procedure Step Description	(0040,0007)	Return value	
>> Scheduled Procedure Step ID	(0040,0009)	Return value	
Requested Procedure ID	(0040,1001)	Filled by user	Wildcards accepted. May not be supported by peer.

The following table summarizes the behavior in response to command statuses:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000H	Show success indicator and display results
Pending	Matching continues	FF00H	Results are added to the display
Other	Failure	Any other status	Stop and display error message

TABLE 3-22 DICOM COMMAND RESPONSE STATUS HANDLING FOR MODALITY WORKLIST INFORMATION MODEL FIND SOP CLASS

3.2.1.3.5 Activity – Start/End/Cancel Procedure

3.2.1.3.5.1 DESCRIPTION AND SEQUENCING OF EVENTS

When automatic MPPS is enabled for the selected Worklist Server, MODALIZER+ Sends an MPPS N-CREATE and N-SET Commands with study status “IN PROGRESS”, “COMPLETED” or “DISCONTINUED”.

A MPPS N-CREATE with study status “IN PROGRESS” is sent when starting a new procedure from the Modality Worklist Screen when:

1. The user double clicks a row in the Modality Worklist Search results or
2. The user clicks the Next button in the Modality Worklist Screen while a row in the Modality Worklist Search results is selected.

A MPPS N-SET with study status “COMPLETED” is sent when clicking the “DONE” button in the Procedure Completed screen.



A MPPS N-SET with study status “DISCONTINUED” is sent when clicking the “Cancel” button after a procedure has started.

3.2.1.3.5.2 PRESENTATION CONTEXTS FOR MODALITY PERFORMED PROCEDURE STEP AS SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

TABLE 3-23 PROPOSED PRESENTATION CONTEXTS FOR MODALITY PERFORMED PROCEDURE STEP SOP CLASS

3.2.1.3.5.3 SOP SPECIFIC CONFORMANCE STATEMENT FOR MODALITY PERFORMED PROCEDURE STEP SOP CLASS

MODALIZER+ expects the MPPS SCP to return a new Affected SOP Instance UID in the N-CREATE Response.

Service Status	Further Meaning	Error Code	MPPS N-CREATE Behavior	MPPS N-SET Behavior
Success	Success	0000H	MPPS Create Succeeded.	MPPS Update Succeeded.
Other	Failure	Any other status	<p>MPPS Create Failed.</p> <p>Error message is displayed and error info is logged in the log file LastMPPSCreate.log</p> <p>If the user continues the procedure, no further MPPS commands will be sent and the procedure will not have reference to an MPPS record.</p>	<p>MPPS Update Failed.</p> <p>Error message is displayed and error info is logged in the log file LastMPPSCreate.log</p>

TABLE 3-24 MPPS N-CREATE/N-SET COMMAND RESPONSE STATUS HANDLING BEHAVIOR

Name	Tag	Value	Comment
Modality	(0008,0060)	[OT]	
Procedure Code Sequence	(0008,1032)	Empty	
Referenced Patient Sequence	(0008,1120)	Empty	
Patient Name	(0010,0010)	From MWL	
Patient ID	(0010,0020)	From MWL	
Patient Birth Date	(0010,0030)	From MWL	
Patient Sex	(0010,0040)	From MWL	
Study ID	(0020,0010)	From Select Worklist Item	
Performed Station AE Title	(0040,0241)	From Local AE Title in Worklist Server Expander in settings	
Performed Station Name	(0040,0242)	Empty	
Performed Location	(0040,0243)	Empty	
Performed Procedure Step Start Date	(0040,0244)	Current Date	
Performed Procedure Step Start Time	(0040,0245)	Current Time	
Performed Procedure Step End Date	(0040,0250)	Empty	



Performed Procedure Step End Time	(0040,0251)	Empty	
Performed Procedure Step Status	(0040,0252)	[IN PROGRESS]	
Performed Procedure Step ID	(0040,0253)	Formatted Timestamp: yyyymmddhhmmsssttt	
Performed Procedure Step Description	(0040,0254)	Empty	
Performed Procedure Type Description	(0040,0255)	Empty	
Performed Action Item Sequence	(0040,0260)	Empty	
Scheduled Step Attributes Sequence	(0040,0270)	Empty	
> Accession Number	> (0008,0050)	From MWL	
> Referenced Study Sequence	> (0008,1110)	Empty	
> Study Instance UID	> (0020,000d)	From selected MWL or Auto Created	
> Requested Procedure Description	> (0032,1060)	From MWL	
> Scheduled Procedure Step Description	> (0040,0007)	From MWL	
> Scheduled Action Item Code Sequence	> (0040,0008)	Empty	
> Scheduled Procedure Step ID	> (0040,0009)	From MWL	
> Requested Procedure ID	> (0040,1001)	[57087312]	
PerformedSeriesSequence	(0040,0340)	Empty	

TABLE 3-25: MPDS N-CREATE REQUEST IDENTIFIER

Name	Tag	Value	Comment
Procedure Code Sequence	(0008,1032)	Empty	
Performed Procedure Step End Date	(0040,0250)	Current Date	
Performed Procedure Step End Time	(0040,0251)	Current Time	
Performed Procedure Step Status	(0040,0252)	[COMPLETED]	
Performed Procedure Step Description	(0040,0254)	Empty	
Performed Procedure Type Description	(0040,0255)	Empty	
Performed Action Item Sequence	(0040,0260)	Empty	
Performed Series Sequence	(0040,0340)	One Item for every created series	
Retrieve AE Title	> (0008,0054)	Empty	
Series Description	> (0008,103e)	Empty	
Performing Physicians Name	> (0008,1050)	Empty	



Operators Name	> (0008,1070)	Empty	
Referenced Image Sequence	> (0008,1140)	One item for every acquired image	
Referenced SOP Class UID	>> (0008,1150)	SOP Class UID of acquired image	Default: [1.2.840.10008.5.1.4.1.1.7]
Referenced SOP Instance UID	>> (0008,1155)	SOP Instance UID of acquired image	
Protocol Name	> (0018,1030)	[MODALIZERPLUS]	
Series Instance UID	> (0020,000e)	Created Series Instance UID	
Referenced Standalone SOP Instance Sequence	> (0040,0220)	One Item for every report or attached PDF document	
Referenced SOP Class UID	>> (0008,1150)	SOP Class UID of created non image instance	
Referenced SOP Instance UID	>> (0008,1155)	SOP Instance UID of created non image instance	

Table 3-26: MPPS COMPLETED N-SET Identifier Attributes

Name	Tag	Value	Comment
Procedure Code Sequence	(0008,1032)	Empty	
Performed Procedure Step End Date	(0040,0250)	Current Date	
Performed Procedure Step End Time	(0040,0251)	Current Time	
Performed Procedure Step Status	(0040,0252)	[DISCONTINUED]	
Performed Procedure Step Description	(0040,0254)	Empty	
Performed Procedure Type Description	(0040,0255)	Empty	
Performed Action Item Sequence	(0040,0260)	Empty	
Performed Series Sequence	(0040,0340)	Empty	
Retrieve AE Title	> (0008,0054)	Empty	
Series Description	> (0008,103e)	Empty	
Performing Physicians Name	> (0008,1050)	Empty	
Operators Name	> (0008,1070)	Empty	
Referenced Image Sequence	> (0008,1140)	Empty	
Protocol Name	> (0018,1030)	[MODALIZERPLUS]	
Series Instance UID	> (0020,000e)	Auto Generated Series Instance UID	
Referenced Standalone SOP Instance Sequence	> (0040,0220)	Empty	

TABLE 3-27: MPPS DISCONTINUED N-SET IDENTIFIER ATTRIBUTES

3.2.1.3.6 Activity – Send Images

3.2.1.3.6.1 DESCRIPTION AND SEQUENCING OF EVENTS

MODALIZER+ Sends images and other instances using the C-STORE command to remote AE's when:

1. At the end of the conversion wizard when the user selects the Convert and Send action and clicks Next or,
2. In the Operation Completed Screen when the user selects a "Send To" destination and clicks the arrow button next to it or,



3. From the Local Archive “Send To” context menu or,
4. From the viewer screen context menu “Send To” items:
 - a. From the image pane: Send the current image
 - b. From the series pane: Send the selected series
 - c. From the studies pane: Send the selected study

3.2.1.3.6.2 PRESENTATION CONTEXTS FOR STORAGE

MODALIZER+ can send any DICOM Instance with SOP Class listed in Table 3-6: Storage SOP Classes.

For compressed transfer syntaxes MODALIZER+ will propose the original transfer syntax from the DICOM file. For non-compressed transfer syntaxes MODALIZER+ will propose all three non-compressed transfer syntaxes from Table 3-29 Supported Transfer Syntaxes for Storage (first 3 rows in the table)..

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
All storage SOP Classes from Table 3-6: Storage SOP Classes	See Table 3-6: Storage SOP Classes	See Table 3-29 Supported Transfer Syntaxes for Storage	See Table 3-29 Supported Transfer Syntaxes for Storage	SCU	None

TABLE 3-28 SUPPORTED PRESENTATION CONTEXTS FOR STORAGE AS SCU

Transfer Syntax	UID	Compression
Still Image Transfer Syntaxes		
Implicit VR Little Endian	1.2.840.10008.1.2	No compression
Explicit VR Little Endian	1.2.840.10008.1.2.1	No compression
Explicit VR Big Endian	1.2.840.10008.1.2.2	No compression
Lossless Jpeg Process 14 1st order predictor	1.2.840.10008.1.2.4.70	Lossless Compression
Lossless Jpeg Process 14	1.2.840.10008.1.2.4.57	Lossless Compression
Jpeg (Lossy) Process 1	1.2.840.10008.1.2.4.50	
RLE Run-Length-Encoding (Lossless)	1.2.840.10008.1.2.5	Lossless Compression
JPEG 2000 Lossless Only	1.2.840.10008.1.2.4.90	JPEG 2000 Lossless
JPEG 2000 (Lossless or Lossy)	1.2.840.10008.1.2.4.91	JPEG 2000
JPEG 2000 Part 2 Multi-component Image Compression Lossless Only	1.2.840.10008.1.2.4.92	JPEG 2000 Lossless
JPEG 2000 Part 2 Multi-component Image Compression (Lossless or Lossy)	1.2.840.10008.1.2.4.93	JPEG 2000
Video Transfer Syntaxes		
MPEG-2 Main Profile Main Level	1.2.840.10008.1.2.4.100	Video
MPEG-2 Main Profile High Level	1.2.840.10008.1.2.4.101	Video
MPEG-4 AVC/H.264 High Profile Level 4.1	1.2.840.10008.1.2.4.102	Video
MPEG-4 AVC/H.264 BD-Compatable High Profile Level 4.1	1.2.840.10008.1.2.4.103	Video
MPEG-4 AVC/H.264 High Profile Level 4.2 For 2D Video	1.2.840.10008.1.2.4.104	



MPEG-4 AVC/H.264 High Profile Level 4.2 For 3D Video	1.2.840.10008.1.2.4.105	Video
MPEG-4 AVC/H.264 Stereo High Profile Level 4.2	1.2.840.10008.1.2.4.106	Video
HEVC/H.265 Main Profile Level 5.1	1.2.840.10008.1.2.4.107	Video
HEVC/H.265 Main 10 Profile Level 5.1	1.2.840.10008.1.2.4.108	Video

TABLE 3-29 SUPPORTED TRANSFER SYNTAXES FOR STORAGE

Important Notes about MODALIZER+ Video to DICOM conversion:

MODALIZER+ automatically identifies the video stream format and determines the correct DICOM transfer syntax to use.

MODALIZER+ can convert Video to DICOM on hardware with very limited resources. The process is very efficient and doesn't consume much memory and CPU resources.. The video file is not loaded into memory as a whole and therefore there's no need for hardware with large memory or powerful CPU.

3.2.1.3.6.3 SOP SPECIFIC CONFORMANCE STATEMENT FOR VERIFICATION SOP CLASSES

The following table summarizes the behavior in response to command statuses:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000H	Show a green success indicator next to the clicked button.
Other	Failure	Other than 0000H	Show a red failure indicator next to the clicked button.

TABLE 3-30 DICOM COMMAND RESPONSE STATUS HANDLING FOR VERIFICATION SOP CLASS

MODALIZER+ displays a success/failure indicator on the screen. In case of failure, a modal error message is displayed.

3.2.1.3.7 Activity – Storage Commit Request

3.2.1.3.7.1 DESCRIPTION AND SEQUENCING OF EVENTS

When using the local archive and the “Automatically send storage commitment for new studies” option is enabled MODALIZER+ sends a Storage Commitment N-ACTION Request after the storage operation of new procedures.

3.2.1.3.7.2 PRESENTATION CONTEXTS FOR STORAGE COMMITMENT PUSH MODEL

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Little Endian Implicit	1.2.840.10008.1.2	SCU	None

TABLE 3-31 SUPPORTED PRESENTATION CONTEXTS FOR STORAGE

3.2.1.3.7.3 SOP SPECIFIC CONFORMANCE STATEMENT FOR STORAGE COMMITMENT PUSH MODEL SOP CLASS

The following table summarizes the behavior in response to the N-ACTION Response command statuses:

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000H	The operation is successful. The status of the procedure in the local archive is marked as “Committed”
Other	Failure	Other than 0000H	The commit operation failed. The status of the procedure in the local archive is not changed

TABLE 3-32 DICOM N-ACTION COMMAND RESPONSE STATUS HANDLING FOR STORAGE COMMITMENT PUSH MODEL SOP CLASS



Event Type Name	Event Type ID	Meaning	Behavior
Success	1	All instances are safely stored remotely	The procedure is marked as committed. If auto delete after commit is configured, the procedure data will be deleted from the local database and disk.
Failure Exists	2	At least one instance was not stored remotely	The commit operation failed.

TABLE 3-33 STORAGE COMMITMENT N-EVENT-REPORT BEHAVIOR

Event Type Name	Event Type ID	Meaning	Behavior
Success	1	All instances are safely stored remotely	The procedure is marked as committed. If auto delete after commit is configured, the procedure data will be deleted from the local database and disk.
Failure Exists	2	At least one instance was not stored remotely	The commit operation failed. No further action is taken.

TABLE 3-34 STORAGE COMMITMENT N-EVENT-REPORT RESPONSE STATUS REASONS

3.2.1.4 Association Acceptance Policies

3.2.1.4.1 Activity – Store Images

3.2.1.4.1.1 DESCRIPTION AND SEQUENCING OF EVENTS

MODALIZER+ stores DICOM instances sent from remote AE's either as a result of C-MOVE or C-GET request issued by MODALIZER+ itself (see 3.2.1.3.3) or unsolicited store requests. The stored instances are saved on the local hard disk in the local archive folder configured in the settings screen. Every stored file is named according to the following pattern:

<local archive folder>\<study instance uid>\<series instance uid>\<sop instance uid>.dcm

The files are stored using the same transfer syntax as they are received from the network interface.

3.2.1.4.1.2 ACCEPTED PRESENTATION CONTEXTS

3.2.1.4.1.3 SOP SPECIFIC CONFORMANCE STATEMENT FOR STORAGE SOP CLASSES

MODALIZER+ can store any DICOM Instance with SOP Class listed in Table 3-6: Storage SOP Classes.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
All storage SOP Classes from Table 3-6: Storage SOP Classes	See Table 3-6: Storage SOP Classes	See Table 3-29 Supported Transfer Syntaxes for Storage	See Table 3-29 Supported Transfer Syntaxes for Storage	SCP	None

TABLE 3-35 SUPPORTED PRESENTATION CONTEXTS FOR STORAGE AS SCP

MODALIZER+ selects the transfer syntax from the proposed transfer syntaxes according to the order listed in Table 3-29 Supported Transfer Syntaxes for Storage.

**TABLE 3-36 ACCEPTED PRESENTATION CONTEXTS FOR STORAGE SCP**

Status	Meaning	Error Code	Reason
Success	Success	0000H	File stored
Refused	Out of resources	A700H	Failed to create local file

TABLE 3-37 C-STORE RESPONSE STATUSES

3.3 Network Interfaces

MODALIZER+ utilizes the physical medium over which TCP/IP executes, which is dependent on the underlying operating system and hardware.

3.4 Configuration

Application AE Title and listener port are configurable from the settings screen.

Multiple remote applications can be configured (AE Title, IP Address/Host name and Port).

3.4.1 AE Title/Presentation Address Mapping

3.4.1.1 Local AE Titles

The local AE Titles are configurable through the settings screen.

One AE Title can be configured for MPPS and MWL and another (or the same) for Storage.

3.4.1.2 Remote AE Title

The remote AE title is not verified. Any AE title can be used as the calling AE title.

3.4.2 Parameters

Parameter	Configurable	Default Value
Time-out waiting for response to TCP/IP connect request. (Low-level timeout)	Yes, from settings screen	30 Seconds
Association Request/Response Timeout (ARTM)	Same as connection timeout	30 Seconds
General DIMSE level time-out values	Same as connection timeout	30 Seconds
Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)	No	30 Seconds
PDU Size	No	32K

TABLE 3-38 PARAMETERS



4 Media Interchange

4.1 Implementation Model

4.1.1 Application Data Flow

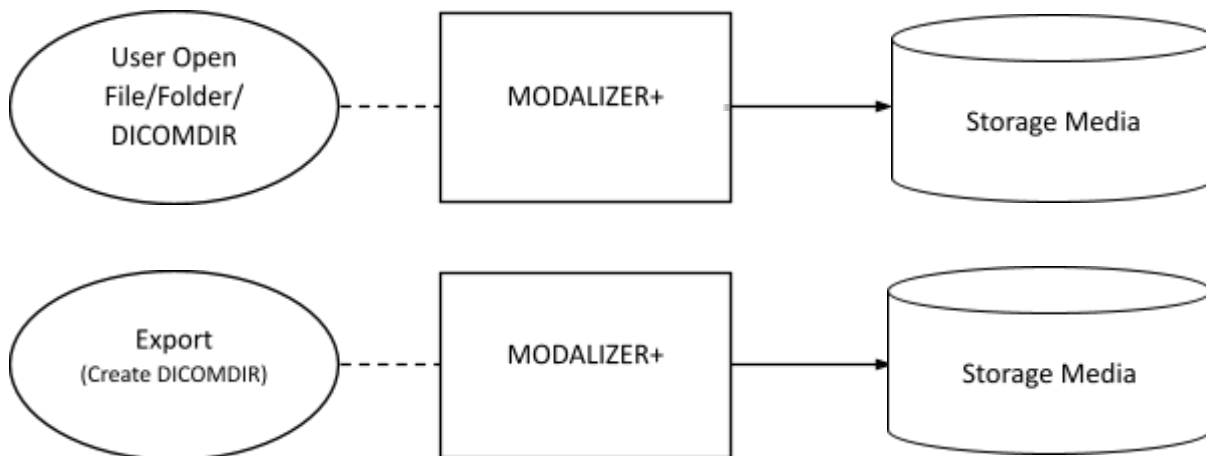


TABLE -: MODALIZER+ APPLICATION DATA FLOW FOR MEDIA INTERCHANGE

The Create DICOMDIR Main menu action Exports studies to media storage (CD/DVD/USB/Local Directory). Studies can be exported from the Local Archive as well by right-clicking on a row and selecting Export from the context menu.

MODALIZER+ Loads and displays DICOM compliant files from any storage media available through the operating system. MODALIZER+ first searches for a DICOMDIR file in the selected path and uses it. If no DICOMDIR file is present in the selected path, MODALIZER+ scans through the path for DICOM files.

DICOM files can be opened by dragging them on the application window or from the Viewer screen Open File/Directory buttons.

4.2 AE Specifications

4.2.1 MODALIZER+ Media Interchange AE Specifications

MODALIZER+ provides standard conformance to the Media Storage Service Class. The Application Profiles and roles are listed below:

Application Profiles Supported	Real World Activity	Role	SC Options
STD-GEN-CD	Load directory or file	FSR	Interchange
STD-GEN-DVD-RAM	Load directory or file	FSR	Interchange
STD-GEN-CD	Import Studies	FSR	Interchange
STD-GEN-DVD-RAM	Import Studies	FSR	Interchange
STD-GEN-CD	Export Study to Storage Media	FSC	Interchange
STD-GEN-DVD-RAM	Export Study to Storage Media	FSC	Interchange

TABLE 4-1 SUPPORT REMOVABLE MEDIA APPLICATION PROFILES



4.2.1.1 Real World Activities

4.2.1.1.1 Activity – Load Directory or File

MODALIZER+ loads all the instances listed in DICOMDIR files, DICOM files and Directories containing DICOM files and displays their content in the MODALIZER+ Image Viewer.

- DICOM Images are displayed inside the MODALIZER+ Image Viewer.
- DICOM Encapsulated PDF's are extracted from the DICOM file and opened using the operating system' default PDF viewer.
- Video streams are either displayed inside the application window or using the operating system' default media player, depending on the capabilities of the installed media player.
- Structured Reports are rendered to html and displayed inside the application window.
- ECG Waveforms are displayed inside the application window.
- If MODALIZER+ can't display a file, a thumbnail image is displayed and the information within the file can be displayed as table of DICOM Tags.
- MODALIZER+ can display the content of the DICOM file as a table of DICOM Tags (click CTRL-H inside the viewer window).

4.2.1.1.2 Activity – Import Studies

From the local archive section of the Settings screen click "Import Files" to browse and import studies from any accessible storage media into the local archive.

The imported files are copied to the local archive storage directory and cataloged in the internal database where they can be searched and displayed.

4.2.1.1.3 Activity – Export Studies

MODALIZER+ exports studies according to the DICOM standard. A DICOMDIR file is created and MODALIZER+ CD viewer is optionally added to the burned CD/DVD.

The export action is accessible from:

1. The "Create DICOMDIR" button on the main screen creates a standard DICOM Media from selected files on your file system.
2. The "Export" action in the local archive context menu exports the selected study.
3. The Convert and Create DICOMDIR option in the Convert screen of the procedure wizard exports the content of the procedure including any attached files, report and taken images.

5 Support of Character Sets

The character set for user input and generated instances can be either the system locale default character set or Unicode. To use unicode, set the "Use Unicode" checkbox at the bottom of the settings screen. If Unicode is not selected, MODALIZER+ uses the default character set for non unicode text as defined in the MS Windows OS System Locale.

Note: If the system setting "Use Unicode UTF-8 for worldwide language support" is on, MODALIZER will encode strings as Unicode, regardless of whether the "Use unicode" checkbox is checked.

MODALIZER+ reads and uses the specific character set (0008,0005) and uses it for displaying text correctly. Multiple character sets values are supported and escape sequence character sets switching is also supported. If the specific character set is absent MODALIZER+ uses the system locale default character set for non unicode characters to display text or Unicode of the "Use Unicode" setting is turned on.

The following table details MODALIZER+ supported character sets.

When displaying files with the value of (0008,0005) from the first column (DICOM character set code) MODALIZER+ will decode the characters using the encoding from the third column (Encoding).

When generating new files and/or when sending DICOM commands that includes specific character set (C-FIND commands), MODALIZER+ will set the value of (0008,0005) by checking the windows operating system settings for "Language for



non-unicode programs” (In Settings > Time & Language > Language and region) and translate it to the first DICOM character set code (highlighted in bold face when there’re more then one). If the “Use unicode character set” is checked MODALIZER+ will set (0008,0005) to “ISO_IR 192” (UTF8).

DICOM character set code	Common Name	Encoding	Language	ISO code
ISO_IR 6	ASCII	ASCII	-	-
ISO_2022_IR 6	ASCII with Esc sequences	us-ascii	-	-
ISO_IR 192	Unicode	UTF8	-	-
ISO_IR 127	Arabic	iso-8859-6	Arabic	ar
ISO_IR 100	Latin 1 (Western European)	iso-8859-1	Afrikaans	af
			Catalan	ca
			Danish	da
			German	de
			English	en
			Spanish	es
			Basque	eu
			Finnish	fi
			Faroese	fo
			French	fr
			Irish	ga
			Galician	gl
			icelandic	is
			Italian	it
			Latin	la
			Malay	ms
ISO_IR 101	Latin 2 (Central European)	iso-8859-2	Dutch	nl
			Norwegian	no
			Portuguese	pt
			Swedish	sv
			Swahili	sw
			Croatian	hr
			Czech	cs
			Hungarian	hu
ISO_IR 109	Latin 3 (South European)	iso-8859-3	Polish	pl
			Romanian	ro
			Slovak	sk
			Slovenian	sl
			Albanian	sq
			Maltese	mt
			Esperanto	eo



ISO_IR 110	Latin 4 (North European)	iso-8859-4	Estonian	et
			Latvian	lv
			Lithuanian	lt
ISO_IR 148	Latin 5 (Turkish)	iso-8859-9	Turkish	tr
ISO_IR 126	Greek	iso-8859-7	Greek	el
ISO_2022_IR 87	Japanese	iso-2022-jp	Japanese	jp
ISO_2022_IR 13				
ISO_2022_IR 159				
ISO_IR 138	Hebrew	iso-8859-8	Hebrew	he
ISO_2022_IR 149	Korean	iso-2022-kr	Korean	ko
ISO_IR 144	Cyrillic	iso-8859-5	Russian	ru
			Bulgarian	bg
			Serbian(Cyrillic)	sr
			Ukrainian	uk
			Macedonian	mk
ISO_IR 58	Simplified Chinese	gb18030	Simplified Chinese	zh
GB18030				

TABLE 5-1 SUPPORTED CHARACTER SETS FOR DISPLAY AND FOR NEW INSTANCES

6 Security

6.1 Security Profiles

MODALIZER+ supports BCP 195 TLS Secure Transport Connection Profile.

The private and public keys used for encryption and identification of MODALIZER+ are stored in the Windows operating system certificate stores (Local Computer store or Current User store depending on user selection).

When using the chain of trust verification method, remote application entities certificates should be stored in the Windows operating system certificate stores.

MODALIZER+ delegates the peer certificate verification to the system. Users may import certificates explicitly to the “Trusted People” directory on the certificate store or when the peer certificates are signed by a CA, import the CE certificate to the trusted certificate authorities’ directory of the certificate store.

The certificate verification method as well as the selected cypher suites are governed by the operating system security settings and may be modified by the organization administrators depending on how they configure and deploy their security policy.

When using the thumbprint verification method, the certificate's thumbprints are stored in the application configuration file.

6.2 Association Level Security

MODALIZER+ accepts incoming associations from any AE Title.

6.3 Application Level Security

MODALIZER+ runs under the Windows operating system and its application security is dictated by the operating system User Access Control (UAC) settings.



7 Annexes

7.1 IOD Contents

7.1.1 Created SOP Instances

MODALIZER+ Creates the following SOP Instances:

1. Secondary Capture images (including MPEG2/4 video streams)
2. Encapsulated PDF Document
3. Basic Text Structured Report

Table 7-1 details the content of Created SOP Instances of the SC Image Storage Class. The Source/Value column is using the following terms:

- Auto Created – A new value is generated automatically by the system. For example UID's, Instance numbers and content dates.
- From source – the data is taken from the SOP Instances of the study that the procedure was performed on. For example Study Instance UID.
- Empty (0 Length) – Type 2 tag with no value
- [value] – constant string value
- Number – constant numeric value

Name	TAG	VR	Source/Value
SOPClassUID	(0008,0016)	UI	SC Image Storage
SOPInstanceUID	(0008,0018)	UI	Auto Created
StudyDate	(0008,0020)	DA	Auto Created/From MWL
StudyTime	(0008,0030)	TM	Auto Created/From MWL
AccessionNumber	(0008,0050)	SH	Auto Created/From MWL
Modality	(0008,0060)	CS	[OT]
ConversionType	(0008,0064)	CS	[DRW]
Manufacturer	(0008,0070)	LO	[HRZ - Software Services]
ReferringPhysiciansName	(0008,0090)	PN	Empty (zero length)
StationName	(0008,1010)	SH	Auto created. Value is set to local AE title in Listener settings.
StudyDescription	(0008,1030)	LO	(no value available)/From MWL RequestedProcedureDescription
ManufacturersModelName	(0008,1090)	LO	[HRZ MODALIZERPLUS]
PatientsName	(0010,0010)	PN	User input/From MWL/From Original Study
PatientID	(0010,0020)	LO	User input/From MWL/From Original Study
PatientsBirthDate	(0010,0030)	DA	User input/From MWL/From Original Study
PatientsSex	(0010,0040)	CS	User input/From MWL/From Original Study
StudyInstanceUID	(0020,000d)	UI	Auto Created/From MWL/From Original Study
SeriesInstanceUID	(0020,000e)	UI	Auto Created
StudyID	(0020,0010)	SH	Auto Created
SeriesNumber	(0020,0011)	IS	Auto Created
InstanceNumber	(0020,0013)	IS	Auto Created
PatientOrientation	(0020,0020)	CS	Empty (zero length)
SamplesPerPixel	(0028,0002)	US	3
PhotometricInterpretation	(0028,0004)	CS	[YBR_FULL_422] when JPEG compressed, [RGB] when not compressed



PlanarConfiguration	(0028,0006)	US	0
Rows	(0028,0010)	US	From converted/taken image
Columns	(0028,0011)	US	From converted/taken image
BitsAllocated	(0028,0100)	US	8
BitsStored	(0028,0101)	US	8
HighBit	(0028,0102)	US	7
PixelRepresentation	(0028,0103)	US	0
LossyImageCompression	(0028,2110)	CS	[01] for JPEG compressed, not present when not compressed
LossyImageCompressionMethod	(0028,2114)	CS	[ISO_10918_1] for JPEG compressed, not present when not compressed
PixelData	(7fe0,0010)	OB	

TABLE 7-1 SC IMAGE SOP CLASS CREATED SOP INSTANCES CONTENT

MODALIZER+ enables the user to override attribute values and add new attributes by adding and modifying the used template from the settings/Override DICOM Attributes. For more information please refer to the users manual.

7.1.2 Usage of Attributes from received IOD's

7.1.2.1 Use of Attributes from Modality Worklist Query

The following table details the attributes that are taken from Modality Worklist item and used in created instance.

Worklist Item Tag	Created Instances Tag
PatientID (0010,0020)	PatientID (0010,0020)
PatientsName (0010,0010)	PatientsName (0010,0010)
PatientsBirthDate (0010,0030)	PatientsBirthDate (0010,0030)
PatientsSex (0010,0040)	PatientsSex (0010,0040)
AccessionNumber (0008,0050)	AccessionNumber (0008,0050)
StudyInstanceUID (0020,000d)	StudyInstanceUID (0020,000d)
Modality (0020,000d)	Modality (0020,000d)
ScheduledProcedureStepStartDate (0040,0002)	StudyDate (0008,0020)
ScheduledProcedureStepStartTime (0040,0003)	StudyTime (0008,0030)
RequestedProcedureDescription (0032,1060)	StudyDescription (0008,1030)
ReferringPhysiciansName (0008,0090)	ReferringPhysiciansName (0008,0090)

TABLE 7-2 USE OF ATTRIBUTES FROM MODALITY WORKLIST QUERY

7.1.2.2 Use of Attributes when adding series to existing study from Q/R

The following table details the attributes that are taken from Query result item and used in created instance when using the add series new series/report feature from the Q/R screen.

Query Result Tag	Created Instances Tag
PatientID (0010,0020)	PatientID (0010,0020)
PatientsName (0010,0010)	PatientsName (0010,0010)
PatientsBirthDate (0010,0030)	PatientsBirthDate (0010,0030)
PatientsSex (0010,0040)	PatientsSex (0010,0040)
AccessionNumber (0008,0050)	AccessionNumber (0008,0050)
StudyInstanceUID (0020,000d)	StudyInstanceUID (0020,000d)
Modality (0020,000d)	Modality (0020,000d)
StudyDate (0008,0020)	StudyDate (0008,0020)



StudyTime (0008,0030)	StudyTime (0008,0030)
StudyId (0020,0010)	StudyId (0020,0010)
ReferringPhysiciansName (0008,0090)	ReferringPhysiciansName (0008,0090)

TABLE 7-3 USE OF ATTRIBUTES FROM Q/R

7.1.2.3 Use of Attributes when adding series to existing local study

The following table details the attributes that are taken from Query result item and used in created instance when using the add series new series/report feature from the Local Archive screen.

Original Instance Tag	Created Instances Tag
PatientID (0010,0020)	PatientID (0010,0020)
PatientsName (0010,0010)	PatientsName (0010,0010)
PatientsBirthDate (0010,0030)	PatientsBirthDate (0010,0030)
PatientsSex (0010,0040)	PatientsSex (0010,0040)
AccessionNumber (0008,0050)	AccessionNumber (0008,0050)
StudyInstanceUID (0020,000d)	StudyInstanceUID (0020,000d)
StudyDate (0008,0020)	StudyDate (0008,0020)

TABLE 7-4 USE OF ATTRIBUTES FROM EXISTING STUDY

TABLE 7-2 USE OF ATTRIBUTES FROM RECEIVED IOD'S TO FORM IMAGE SEQUENCES

7.2 Data Dictionary of Private Attributes

N/A

7.3 Grayscale Image Consistency

N/A

7.4 Standard Extended/Specialized/Private SOP Classes

N/A

7.5 Private Transfer Syntaxes

N/A