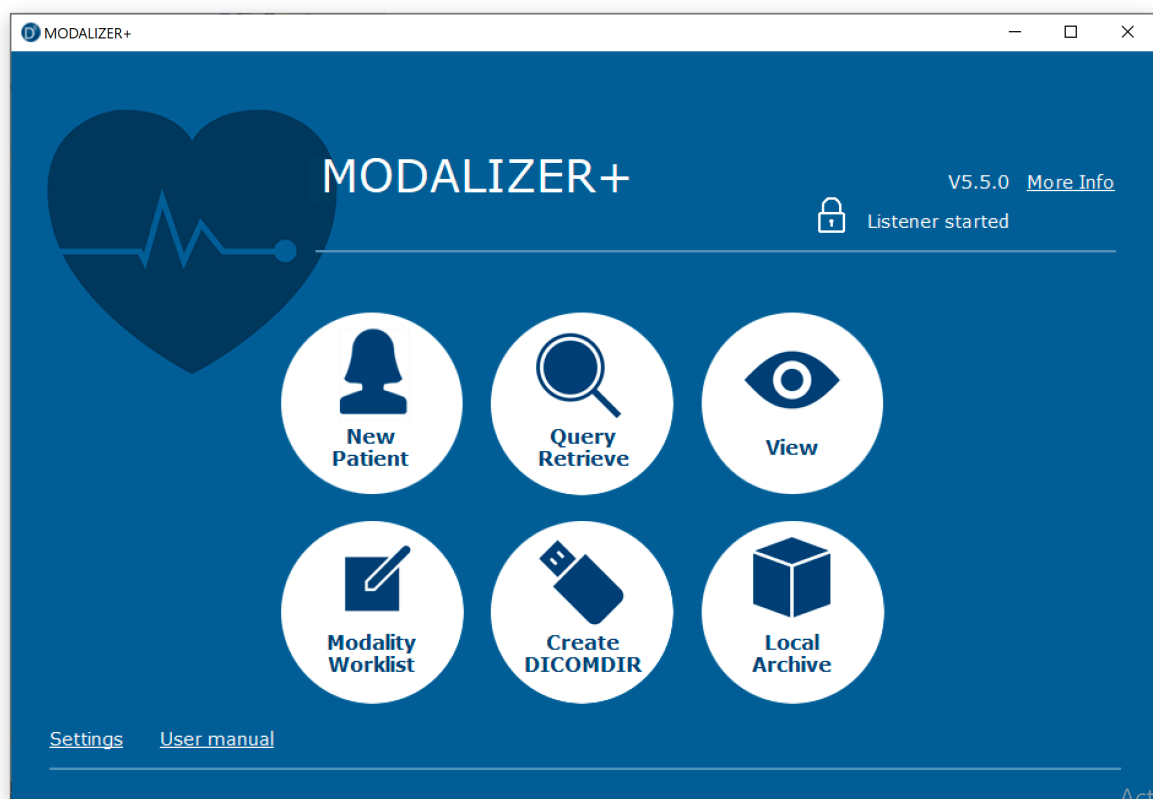


# MODALIZER+

DICOM Conformance Statement

## POINT-OF-CARE IMAGING AND REPORTING



H.R.Z Software Services LTD  
POB 6489 Tel-Aviv 6106401  
Phone/Fax: +972-3-5443138  
Internet: [www.roniza.com](http://www.roniza.com)  
E-mail: [info@roniza.com](mailto:info@roniza.com)





## Revision History

Revision	Date	Author	Comments
1	December 31, 2015	Roni Zaharia	First published version
2	December 13, 1018	Roni Zaharia	Update to version 5.5 Add C-GET Add Secure DICOM (TLS) Add Unicode character set

## Reference Documents

Title	Date	Link
MODALIZER+ User's Manual	November 11, 2019	<a href="http://downloads.roniza.com/MODALIZERPLUS/MODALIZER+%20User%20Manual.pdf">http://downloads.roniza.com/MODALIZERPLUS/MODALIZER+%20User%20Manual.pdf</a>
The DICOM Standard PS 3	2019d Version	DICOM PS3.1 – PS3.22 2019d <a href="https://www.dicomstandard.org/current/">https://www.dicomstandard.org/current/</a>
The MODALIZER+™ Application	November 12, 2019	<a href="http://downloads.roniza.com/MODALIZERPLUS/">http://downloads.roniza.com/MODALIZERPLUS/</a>



## 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 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**

Secure DICOM (TLS 1.2) is supported for all network services.



## 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:

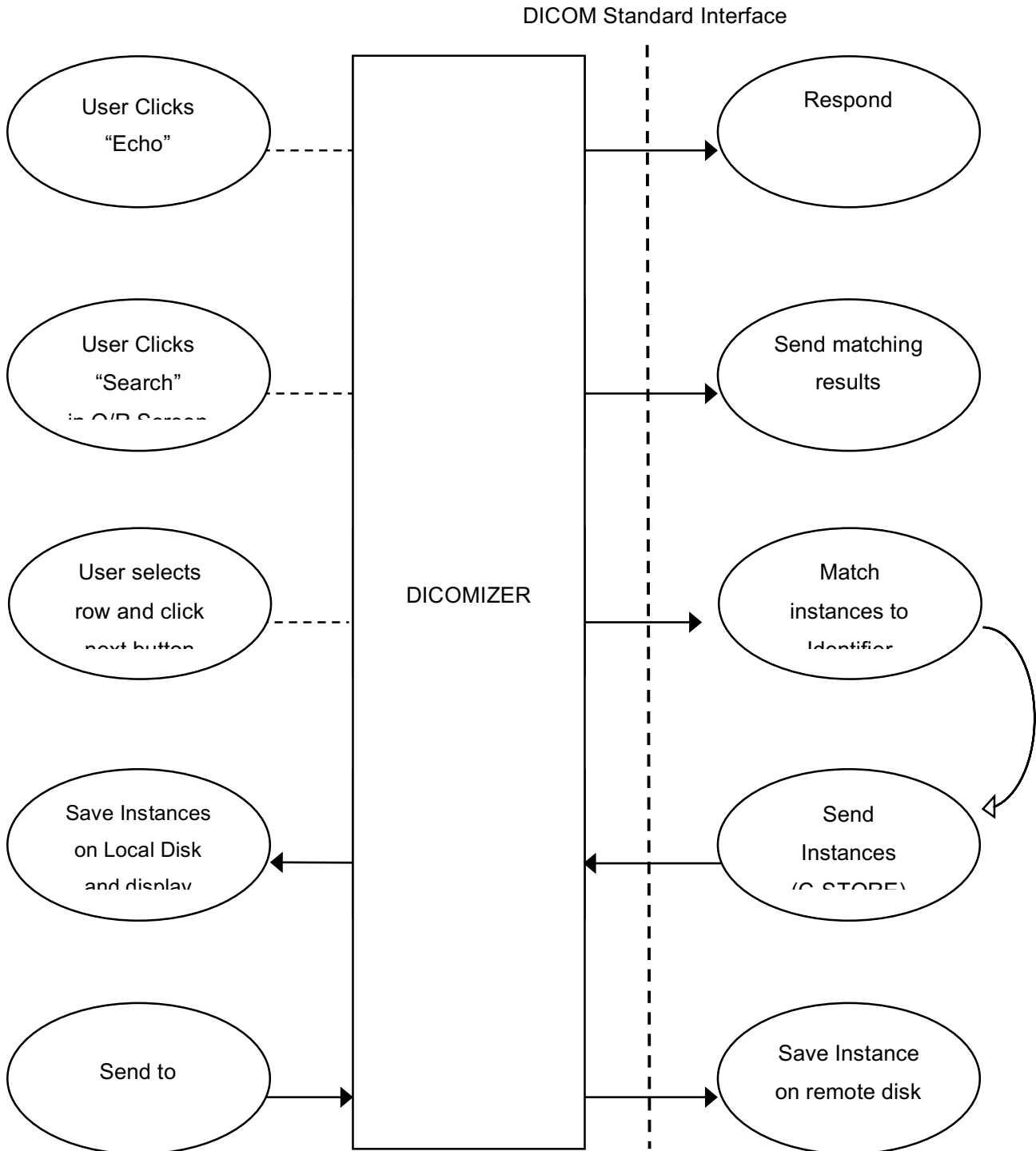
AE	DICOM Application Entity
AET	Application Entity Title
ASCE	Association Control Service Element
CD-R	Compact Disk Recordable
CSE	Customer Service Engineer
DVD	Digital Video Disk
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
IOD	(DICOM) Information Object Definition
ISO	International Standard Organization
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
R	Required Key Attribute
O	Optional Key Attribute
U	Unique Key Attribute



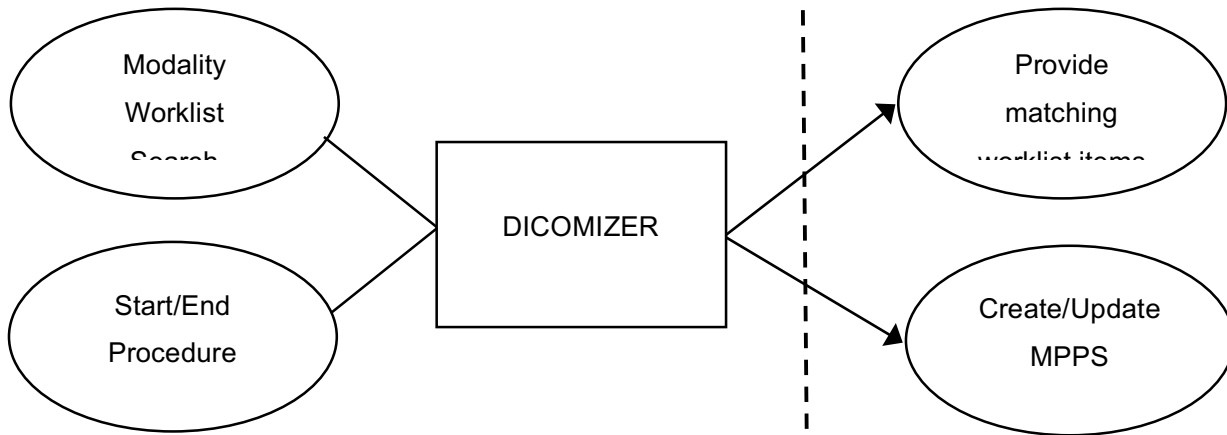
### 3 Networking

#### 3.1 Implementation Model

##### 3.1.1 Application Data Flow



**TABLE 3-1: 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

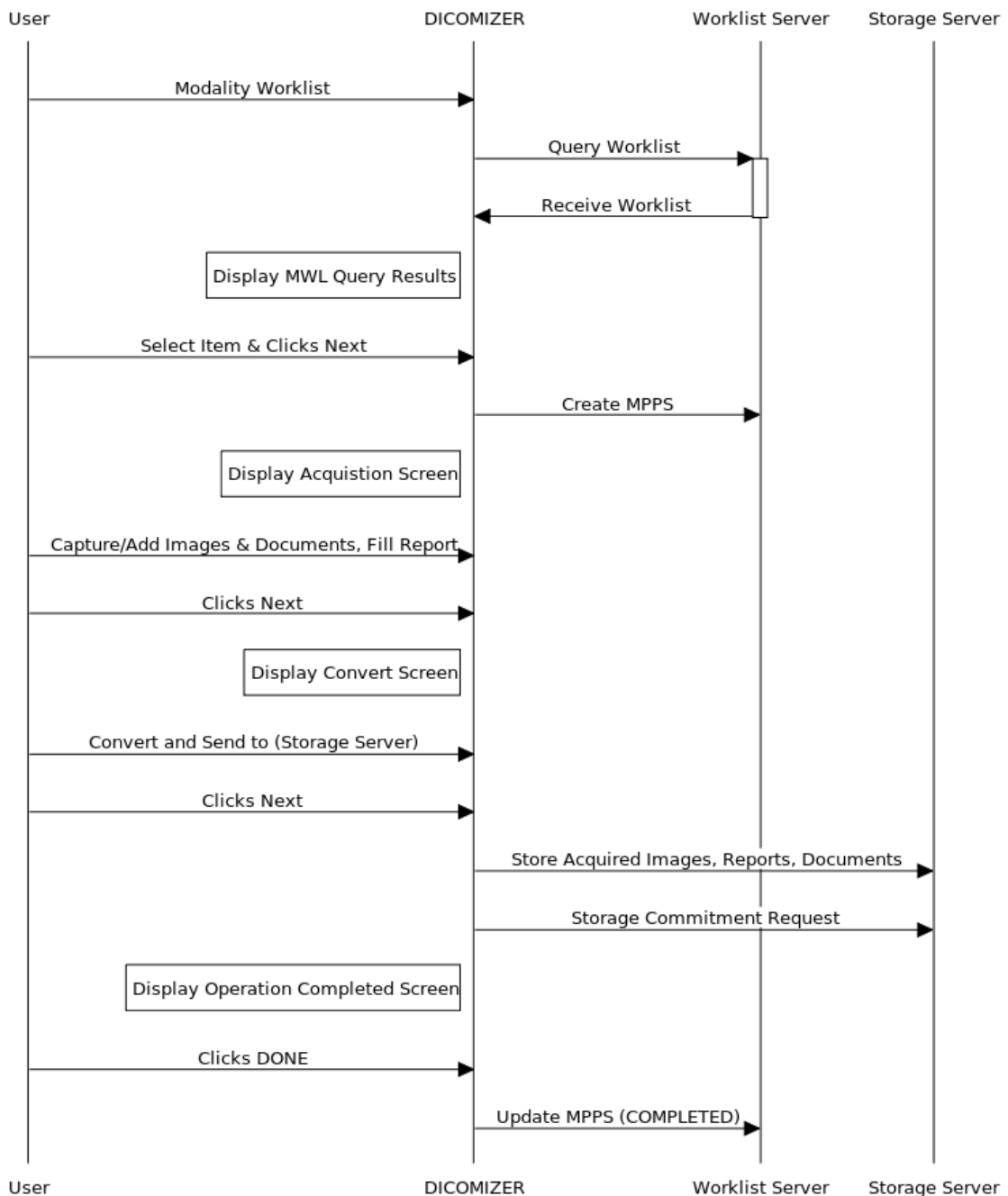
#### 3.1.2.1 The MODALIZER+

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)

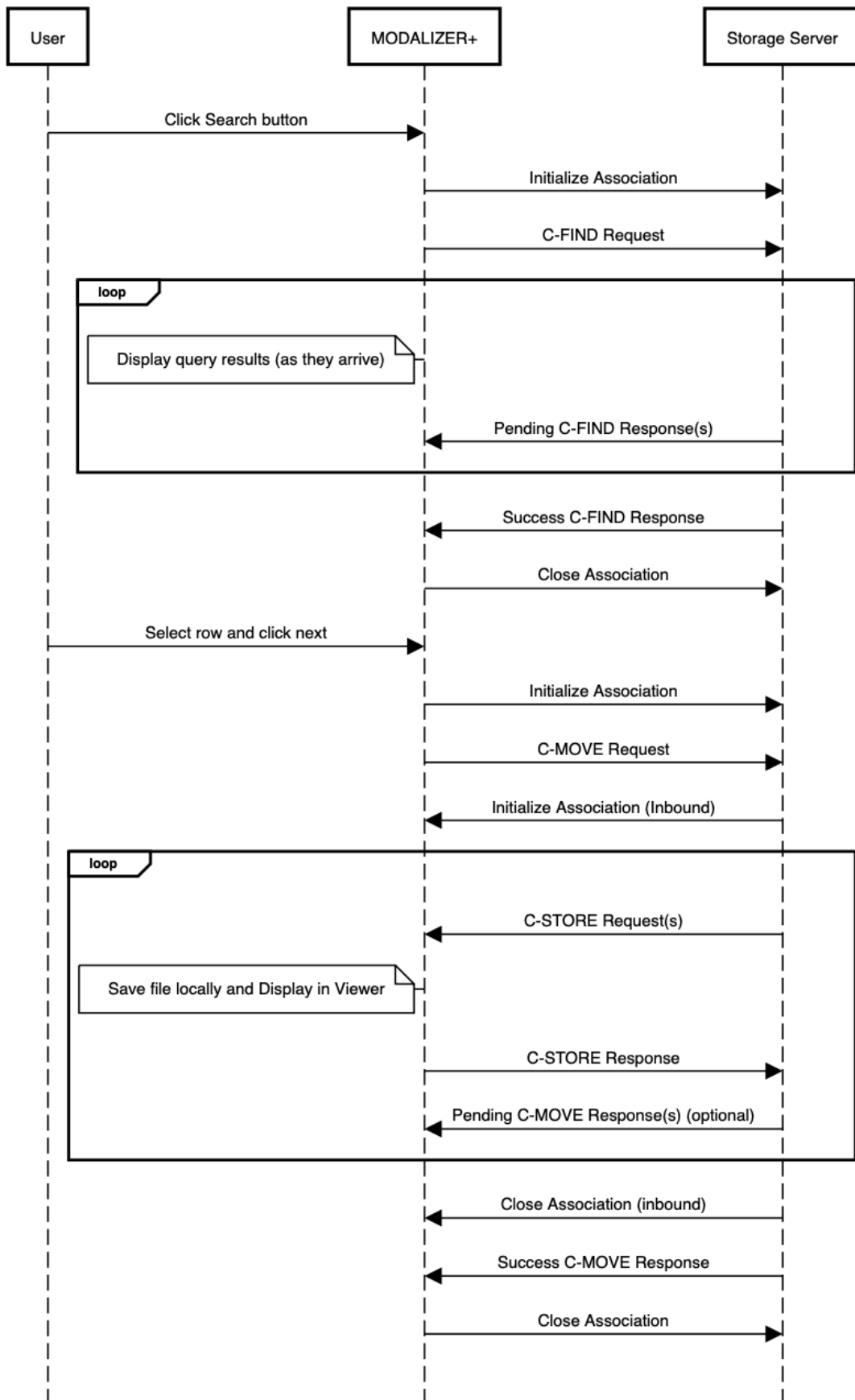






Diagram text:

title Query/Retrieve Sequence C-MOVE option

User->MODALIZER+: Click Search button

MODALIZER+>Storage Server: Initialize Association

MODALIZER+>Storage Server: C-FIND Request

loop

note left of MODALIZER+: Display query results (as they arrive)

Storage Server->MODALIZER+: Pending C-FIND Response(s)

end

Storage Server->MODALIZER+: Success C-FIND Response

MODALIZER+>Storage Server: Close Association

User->MODALIZER+: Select row and click next

MODALIZER+>Storage Server: Initialize Association

MODALIZER+>Storage Server: C-MOVE Request

Storage Server->MODALIZER+: Initialize Association (Inbound)

loop

Storage Server->MODALIZER+: C-STORE Request(s)

note left of MODALIZER+: Save file locally and Display in Viewer

MODALIZER+>Storage Server: C-STORE Response

Storage Server->MODALIZER+: Pending C-MOVE Response(s) (optional)

end

Storage Server->MODALIZER+: Close Association (inbound)

Storage Server->MODALIZER+: Success C-MOVE Response

MODALIZER+>Storage Server: Close Association



3.1.2.2.3 Query Retrieve Sequence (C-GET option)

Query/Retrieve Sequence (C-GET option)

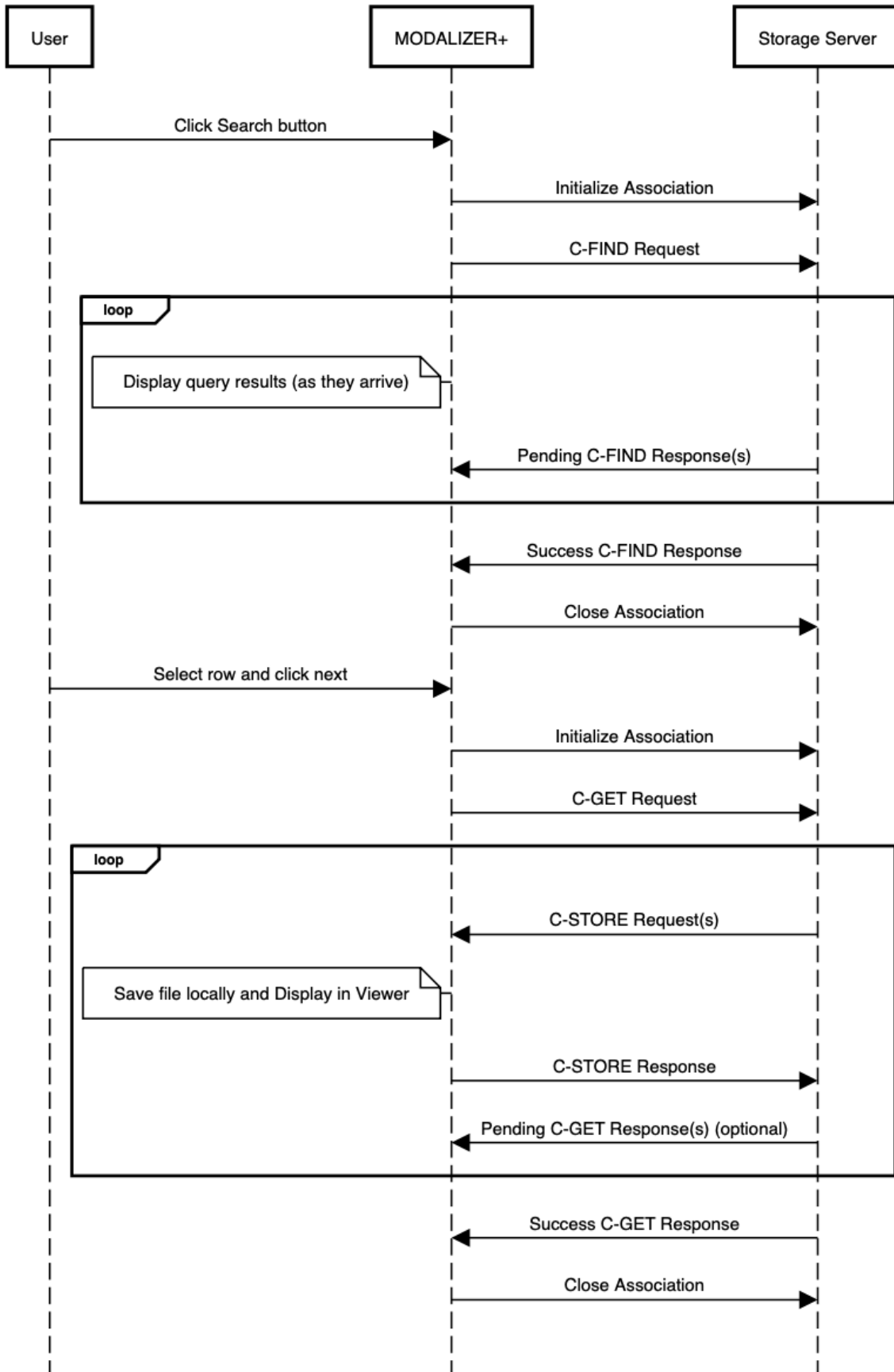


Diagram text:



```
title Query/Retrieve Sequence C-GET option
User->MODALIZER+: Click Search button
MODALIZER+->Storage Server: Initialize Association
MODALIZER+->Storage Server: C-FIND Request
loop
note left of MODALIZER+:Display query results (as they arrive)
Storage Server->MODALIZER+:Pending C-FIND Response(s)
end
Storage Server->MODALIZER+:Success C-FIND Response
MODALIZER+->Storage Server: Close Association
User->MODALIZER+:Select row and click next
MODALIZER+->Storage Server: Initialize Association
MODALIZER+->Storage Server: C-GET Request
loop
Storage Server->MODALIZER+:C-STORE Request(s)
note left of MODALIZER+: Save file locally and Display in Viewer
MODALIZER+->Storage Server: C-STORE Response
Storage Server->MODALIZER+: Pending C-GET Response(s) (optional)
end
Storage Server->MODALIZER+: Success C-GET Response
MODALIZER+->Storage Server: Close Association
```



## 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	Yes	No

**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

**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_0_0_4

**TABLE 3-10 DICOM IMPLEMENTATION CLASS UID AND VERSION NAME**

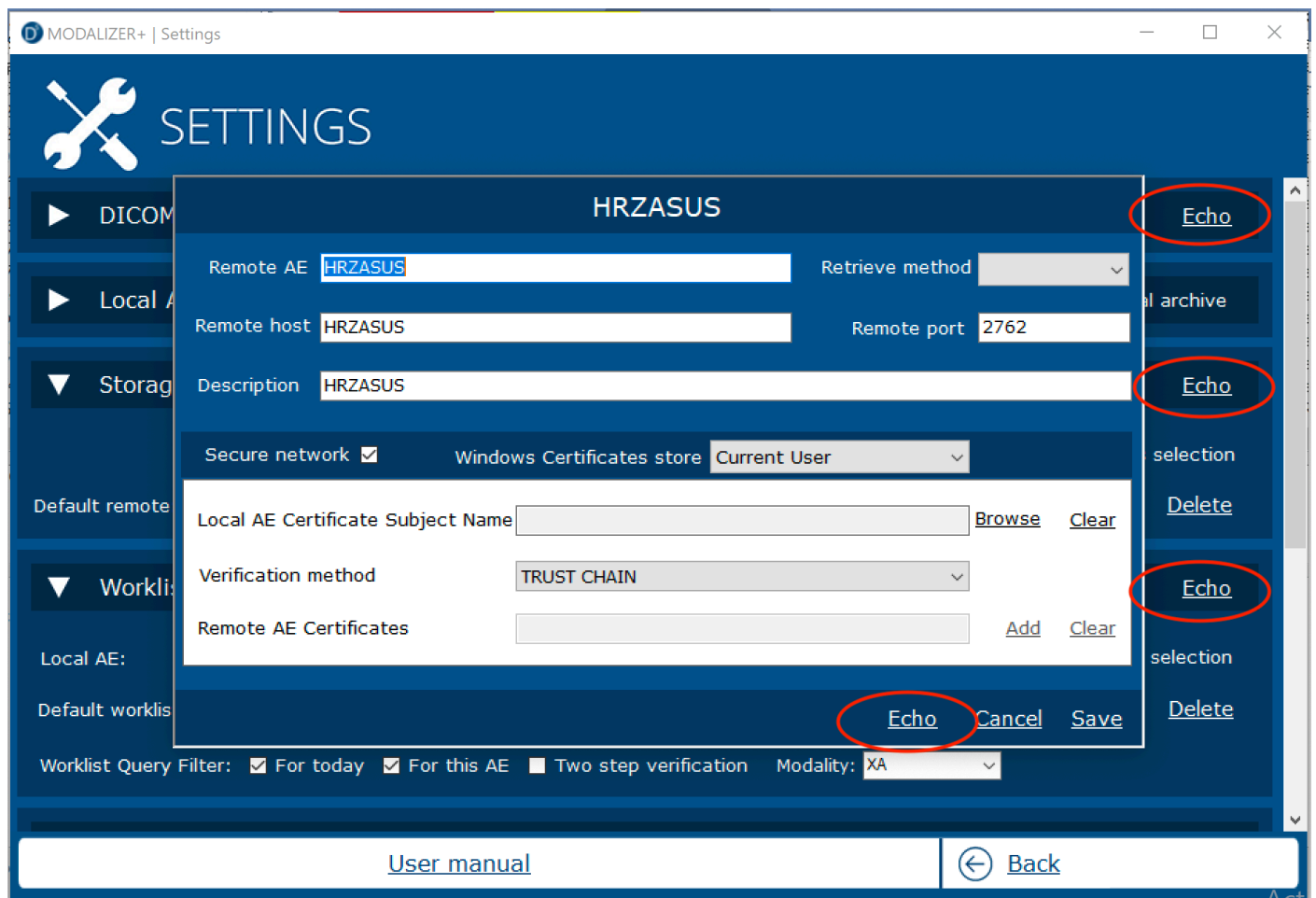
### 3.2.1.3 Association Initiation Policies

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.

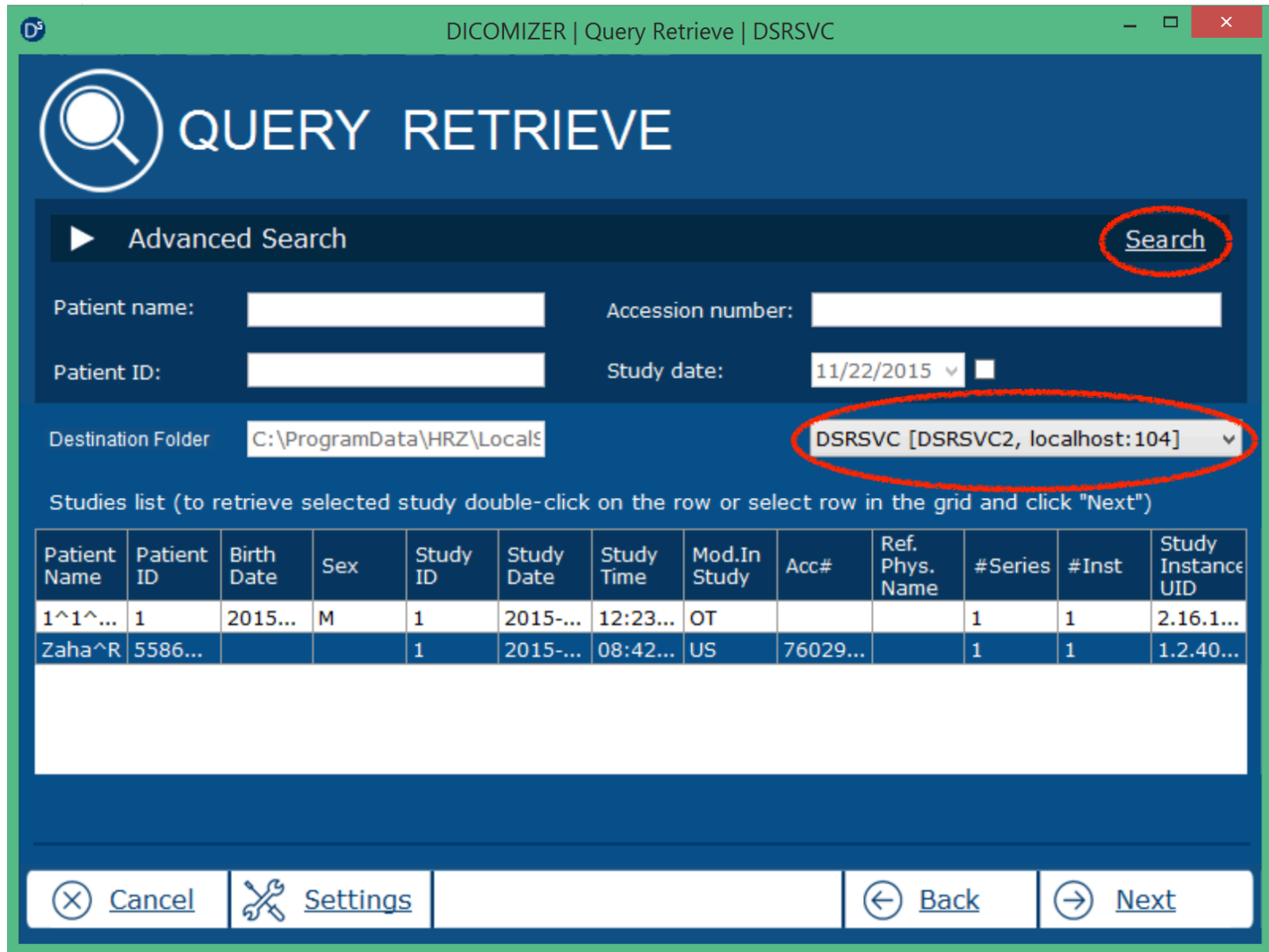


FIGURE 3-1: THE QUERY/RETRIEVE SCREEN

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
Q/R Level	(0008,0052)	"STUDY"	
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.
Patient Birth Date	(0010,0030)	Filled by user	



Patient Sex	(0010,0040)	Filled by user	
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.
Modalities in Study	(0008,0051)	Filled by user	Values can be keyed in or selected from preconfigured list.
Referring Physician Name	(0008,0090)	Return Value	
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

MODALIZER+ issues a C-MOVE command when:

1. The double-clicks a row in the results grid or
2. when one of the rows in the results grid is highlighted and the user clicks the next button at the bottom of the 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 caring 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

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 bottom of the screen is updated when pending responses are received from the peer AE.

#### 3.2.1.3.3.2 PRESENTATION CONTEXTS FOR RETRIEVE

<b>Presentation Context Table</b>
-----------------------------------



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 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 3-16 PROPOSED PRESENTATION CONTEXTS FOR STUDY ROOT Q/R MOVE 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 3-17 STUDY ROOT C-MOVE 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 3-18 DICOM COMMAND RESPONSE STATUS HANDLING FOR STUDY ROOT Q/R MOVE 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* (marked below) button and
6. when the user changes the selected remote AE's dropdown (marked blow)

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 and stops the query.



**TABLE 3-19: THE MODALITY WORKLIST SCREEN**

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	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 3-20 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
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.
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	
Scheduled Procedure Step Description	(0040,0007)	Return value	
Scheduled Procedure Step ID	(0040,0009)	Return value	
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 3-21 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”.

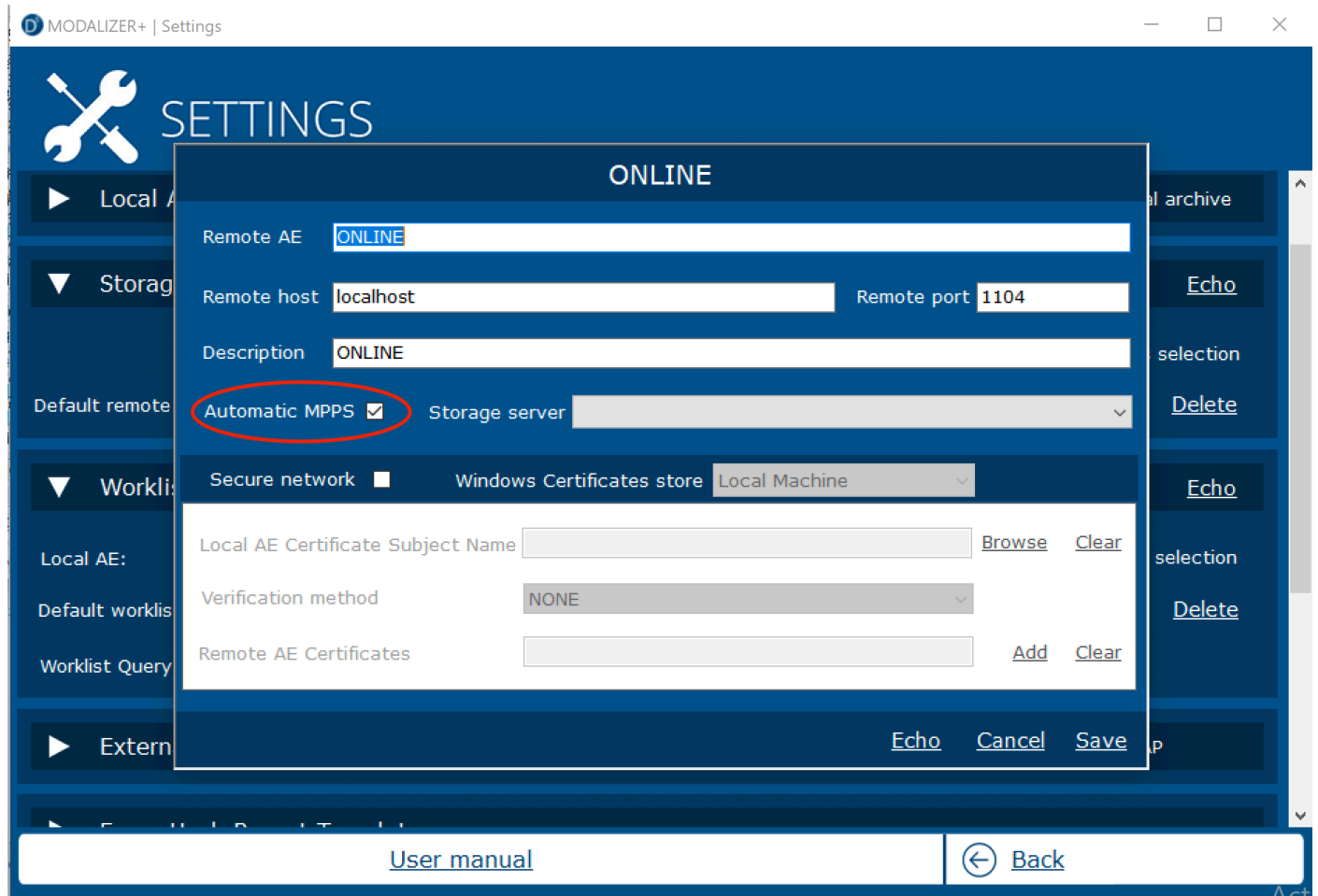
A MPPS N-CREATE with study status “IN PROGRESS” is sent when starting a new procedure from the Modality Worklist Screen:

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” after a procedure has started.



**TABLE 3-22 ENABLING MODALITY PERFORMED PROCEDURE STEP IN THE SETTINGS SCREEN**

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	MPPS Create Failed.	MPPS Update Failed.



			<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>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: yyyymmddhhmmsstt	
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: MPPS N-CREATE REQUEST IDENTIFIER**

<b>Name</b>	<b>Tag</b>	<b>Value</b>	<b>Comment</b>
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)	[DICOMIZER]	
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)	[DICOMIZER]	
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.

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
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
MPEG2 Main Profile at Main Level	1.2.840.10008.1.2.4.100	MPEG2
MPEG2 Main Profile at High Level	1.2.840.10008.1.2.4.101	MPEG2
MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.102	MPEG4
MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103	MPEG4

**TABLE 3-29 SUPPORTED TRANSFER SYNTAXES FOR STORAGE**

*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*

<b>Presentation Context Table</b>
-----------------------------------



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 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+ utilize 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 application 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

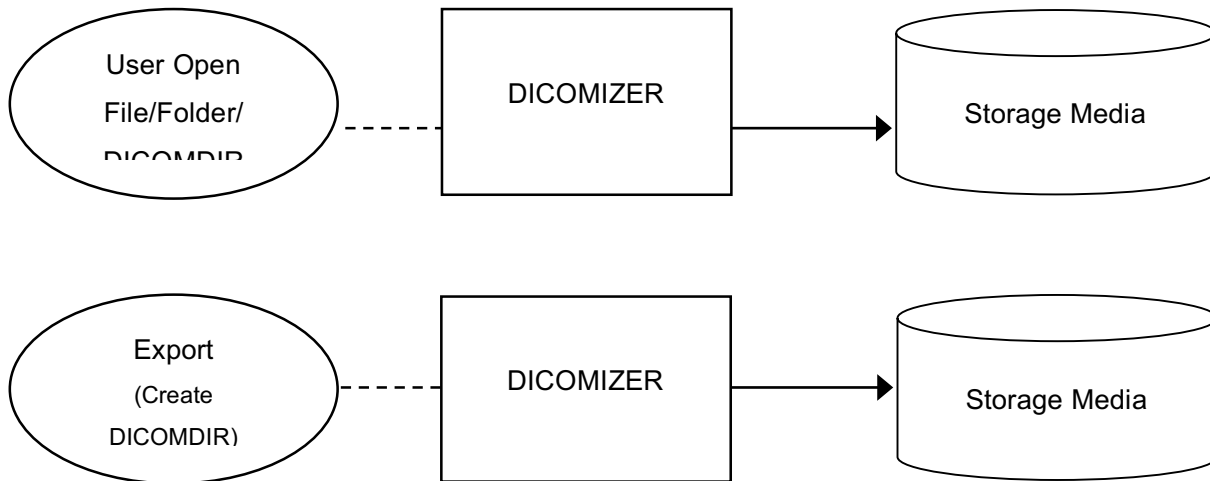
**TABLE 3-38 PARAMETERS**



## 4 Media Interchange

### 4.1 Implementation Model

#### 4.1.1 Application Data Flow



**TABLE 4-1: DICOMIZER 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
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#### 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

MODALIZER+ supports the DICOM default character-set ISO\_IR 100.

MODALIZER+ supports the Unicode dataset ISO\_IR 192.



## 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 chain of trust verification method, peer certificates should be stored in the Windows operating system certificate stores.

MODALIZER+ delegates the peer certificate verification to the system. Users may import explicitly certificates 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 certificates 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 Creates 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	[MODALIZERPLUS]
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.

## 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	Comment
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)	

### 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	Comment
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)	

### 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	Comment
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 7-2 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