1. Document Revision

Version	Change Description	Change Date
1.0	Initial release	Aug 25, 2023

Table of Contents

2. DEFINITIONS

Acronym/Terms	Definitions
AE	Application Entity
ANSI	American National Standards Institute
DICOM	Digital Imaging and Communications in Medicine
DIMSE-C	DICOM Message Service Element-Composite
DIMSE-N	DICOM Message Service Element-Normalized
FSC	File Set Creator
FSR	File Set Reader
FSU	File Set Updater
PDU	Protocol Data Unit
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
UID	Unique Identifier
WADO	Web Access to DICOM Persistent Objects
WADO-RS DICOMweb	Implementation according PS3.18 10.4

3. AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM 3.0 Standard and with the terminology and concepts which are used in this standard. This document specifies the compliance of Falcon MD to file reading/writing and file transferring support to the DICOM 3.0 standard.

4. CONFORMANCE STATEMENT OVERVIEW

This section is an abbreviated DICOM conformance statement for Falcon MD, a software for review and post-processing of diagnostic medical images and information.
Tables of Supported Networking DICOM Service (SOP) Classes is provided with roles (User/Provider), organized in 2 categories: Transfer and Query/Retrieve

4.1. IMAGE, WAVEFORM, MEASUREMENTS AND REPORTS TRANSFER/STORING

SOP Classes	UID	SCU	SCP
ComputedRadiographyImageStorage	1.2.840.10008.5.1.4.1.1.1	YES	YES

DigitalXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.1	YES	YES
DigitalMammographyXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.2	YES	YES
DigitalIntraOralXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.3	YES	YES
CTImageStorage	1.2.840.10008.5.1.4.1.1.2	YES	YES
EnhancedCTImageStorage	1.2.840.10008.5.1.4.1.1.2.1	YES	YES
UltrasoundMultiframeImageStorage	1.2.840.10008.5.1.4.1.1.3.1	YES	YES
MRImageStorage	1.2.840.10008.5.1.4.1.1.4	YES	YES
EnhancedMRImageStorage	1.2.840.10008.5.1.4.1.1.4.1	YES	YES
UltrasoundImageStorage (Retired)	1.2.840.10008.5.1.4.1.1.6	YES	YES
UltrasoundImageStorage	1.2.840.10008.5.1.4.1.1.6.1	YES	YES
SecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7	YES	YES
MultiframeTrueColorSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.4	YES	YES
XRayAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.12.1	YES	YES
XRayRadiofluoroscopicImageStorage	1.2.840.10008.5.1.4.1.1.12.2	YES	YES
XRay3DAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.13.1.1	YES	YES
VLEndoscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.1	YES	YES
VLMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.2	YES	YES
OphthalmicPhotography8BitImageStorage	1.2.840.10008.5.1.4.1.1.77.1.5.1	YES	YES
ComprehensiveSR	1.2.840.10008.5.1.4.1.1.88.33	YES	YES
EncapsulatedPDFStorage	1.2.840.10008.5.1.4.1.1.104.1	YES	YES
PositronEmissionTomographyImageStorage	1.2.840.10008.5.1.4.1.1.128	YES	YES
RTPlanStorage	1.2.840.10008.5.1.4.1.1.481.5	YES	YES
NuclearMedicineImageStorage	1.2.840.10008.5.1.4.1.1.20	YES	YES
LegacyConvertedEnhancedCTImageStorage	1.2.840.10008.5.1.4.1.1.2.2	YES	YES
LegacyConvertedEnhancedMRImageStorage	1.2.840.10008.5.1.4.1.1.4.4	YES	YES
EnhancedXAImageStorage	1.2.840.10008.5.1.4.1.1.12.1.1	YES	YES
MultiframeGrayscaleWordSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.3	YES	YES
DigitalMammographyXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.2.1	YES	YES

4.2. QUERY/RETRIEVE

SOP Classes	UID	SCU	SCP
FIND Study Root Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.2.1	YES	NO
MOVE Study Root Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.2.2	YES	YES
GET Study Root Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.2.3	YES	NO
FIND Patient Root Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.1.1	NO	NO
MOVE Patient Root Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.1.2	NO	NO
GET Patient Root Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.1.3	NO	NO

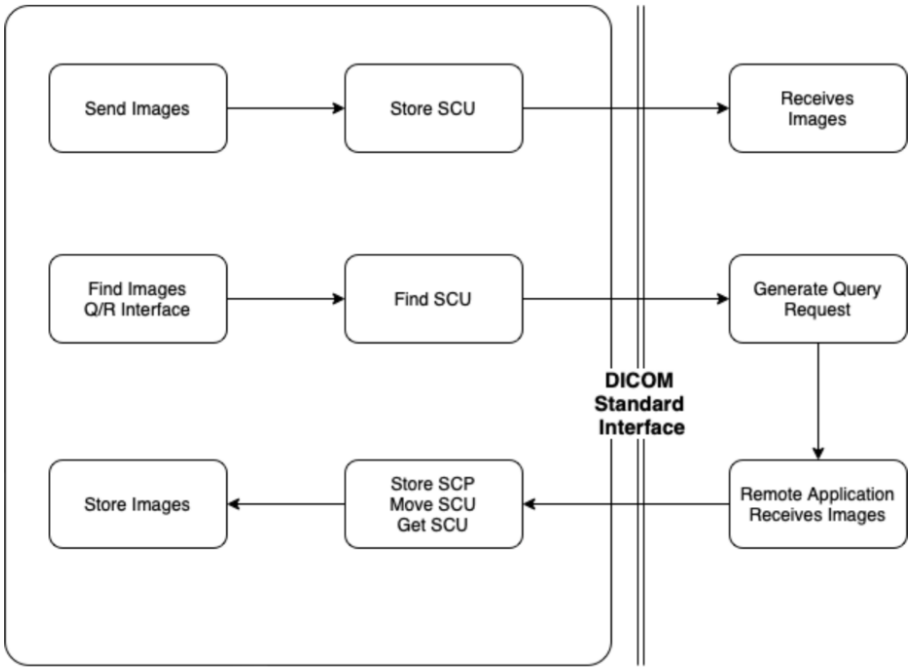
FIND Patient/Study Only Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.3.1	NO	NO
MOVE Patient/Study Only Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.3.2	NO	NO
GET Patient/Study Only Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.3.3	NO	NO
WADO	N/A	YES	NO

4.3. DICOMWEB SERVICES

Network Service	User of Service (User Agent)	Provider of Service (Origin Server)
WADO-RS Retrieve Study Retrieve Study Metadata Retrieve Frame Retrieve Bulk Data	NO NO NO NO	YES NO NO NO
QIDO-RS Search For Studies Search For Series Search For Instances	NO NO NO	NO NO NO
STOW-RS Store Instances	NO	NO

5. NETWORKING

5.1. IMPLEMENTATION MODEL



5.1.0.1.

5.1.1. Application Data Flow

The Application Entities (AEs) SCP & SCU detailed in the application data flow diagram are all included in the Falcon MD application software.
They may be invoked multiple times and the instances may operate simultaneously and asynchronously.

5.1.2. Functional Definition of Application Entities

5.1.2.1. Store-SCU

Falcon MD can send DICOM objects through a Store-SCU function. The user selects the destination AE through a graphic user interface. The user can select a proposed Presentation Context priority list for the Store-SCU.

5.1.2.2. Store-SCP

Falcon MD can accept CSTORE associations at any time. Each object received through this association is written on the disk. All AETitles are accepted, there are no restrictions based on the AETitle.

5.1.2.3. Find-SCU

Falcon MD can generate CFIND associations to browse and search studies on a remote DICOM node. The Find-SCU is at STUDY or SERIES level. PATIENT and IMAGE C-Find-SCU are not supported.

5.1.2.4. Move-SCU / Get-SCU

Following a Find-SCU query, the user can retrieve the selected studies or series, by generating a Move-SCU or Get-SCU retrieve. The images are received and stored in the Falcon MD database.

5.1.2.5. WADO-RS SCU

Falcon MD can produce WADO requests to retrieve images in the Query/Retrieve interface.

5.1.3. Sequencing of Real World Activities

All the application entities are asynchronous processes that can run at the same time. All DICOM objects are stored in the Falcon MD database, when received. Falcon MD can only send DICOM objects that are stored in the Falcon MD database. Falcon MD must be running on the Operating System to offer the applications entities (SCP).

5.2. AE SPECIFICATIONS

5.2.1. Store-SCU

5.2.1.1. SOP Classes

Falcon MD Store-SCU provides Standard Conformance to the following DICOM 3.0 SOP Classes:

SOP Classes	UID	SCU
ComputedRadiographyImageStorage	1.2.840.10008.5.1.4.1.1.1	YES
DigitalXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.1	YES
DigitalMammographyXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.2	YES
DigitalIntraOralXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.3	YES
CTImageStorage	1.2.840.10008.5.1.4.1.1.2	YES
EnhancedCTImageStorage	1.2.840.10008.5.1.4.1.1.2.1	YES
UltrasoundMultiframeImageStorage	1.2.840.10008.5.1.4.1.1.3.1	YES
MRImageStorage	1.2.840.10008.5.1.4.1.1.4	YES
EnhancedMRImageStorage	1.2.840.10008.5.1.4.1.1.4.1	YES
UltrasoundImageStorage (Retired)	1.2.840.10008.5.1.4.1.1.6	YES
UltrasoundImageStorage	1.2.840.10008.5.1.4.1.1.6.1	YES
SecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7	YES
MultiframeTrueColorSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.4	YES
XRayAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.12.1	YES
XRayRadiofluoroscopicImageStorage	1.2.840.10008.5.1.4.1.1.12.2	YES
XRay3DAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.13.1.1	YES
VLEndoscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.1	YES
VLMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.2	YES
OphthalmicPhotography8BitImageStorage	1.2.840.10008.5.1.4.1.1.77.1.5.1	YES

ComprehensiveSR	1.2.840.10008.5.1.4.1.1.88.33	YES
EncapsulatedPDFStorage	1.2.840.10008.5.1.4.1.1.104.1	YES
PositronEmissionTomographyImageStorage	1.2.840.10008.5.1.4.1.1.128	YES
RTPlanStorage	1.2.840.10008.5.1.4.1.1.481.5	YES
NuclearMedicineImageStorage	1.2.840.10008.5.1.4.1.1.20	YES
LegacyConvertedEnhancedCTImageStorage	1.2.840.10008.5.1.4.1.1.2.2	YES
LegacyConvertedEnhancedMRImageStorage	1.2.840.10008.5.1.4.1.1.4.4	YES
EnhancedXAImageStorage	1.2.840.10008.5.1.4.1.1.12.1.1	YES
MultiframeGrayscaleWordSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.3	YES
DigitalMammographyXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.2.1	YES

5.2.1.2. Association Policies

Falcon MD creates a CSTORE association according to the DICOM 3.0 standard. There are no restrictions to external AETitle. The default PDU size is 16384 bytes (minimum is 4096 bytes, maximum is 131072 bytes).
Implementation Identifying Information
Falcon MD Implementation Version Name is OFFIS_DCMTK_365.

5.2.1.3. Association Initiation Policy

Falcon MD Store-SCU AE will initiate a new association to transmit DICOM objects with a CSTORE command when the user requests sending of data from the GUI. The proposed Presentation Contexts will match the DICOM objects that are to be exported over this association. The default timeout for all communications (TCP/IP and DICOM) is 20 seconds.

Proposed Presentation Contexts

Name	UID	Role
Implicit VR - Little Endian	1.2.840.10008.1.2	SCU
Explicit VR - Little Endian	1.2.840.10008.1.2.1	SCU
JPEG 2000 Image Compression, Lossless	1.2.840.10008.1.2.4.90	SCU
JPEG 2000 Image Compression, Lossy	1.2.840.10008.1.2.4.91	SCU

5.2.1.4. Association Acceptance Policy

Falcon MD Store-SCU doesn't accept associations.

5.2.2. Store-SCP

5.2.2.1. SOP Classes

Falcon MD Store-SCP provides Standard Conformance to the following DICOM 3.0 SOP Classes:

SOP Classes	UID	SCP
ComputedRadiographyImageStorage	1.2.840.10008.5.1.4.1.1.1	YES

DigitalXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.1	YES
DigitalMammographyXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.2	YES
DigitalIntraOralXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.3	YES
CTImageStorage	1.2.840.10008.5.1.4.1.1.2	YES
EnhancedCTImageStorage	1.2.840.10008.5.1.4.1.1.2.1	YES
UltrasoundMultiframeImageStorage	1.2.840.10008.5.1.4.1.1.3.1	YES
MRImageStorage	1.2.840.10008.5.1.4.1.1.4	YES
EnhancedMRImageStorage	1.2.840.10008.5.1.4.1.1.4.1	YES
UltrasoundImageStorage (Retired)	1.2.840.10008.5.1.4.1.1.6	YES
UltrasoundImageStorage	1.2.840.10008.5.1.4.1.1.6.1	YES
SecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7	YES
MultiframeTrueColorSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.4	YES
XRayAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.12.1	YES
XRayRadiofluoroscopicImageStorage	1.2.840.10008.5.1.4.1.1.12.2	YES
XRay3DAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.13.1.1	YES
VLEndoscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.1	YES
VLMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.2	YES
OphthalmicPhotography8BitImageStorage	1.2.840.10008.5.1.4.1.1.77.1.5.1	YES
ComprehensiveSR	1.2.840.10008.5.1.4.1.1.88.33	YES
EncapsulatedPDFStorage	1.2.840.10008.5.1.4.1.1.104.1	YES
PositronEmissionTomographyImageStorage	1.2.840.10008.5.1.4.1.1.128	YES
RTPlanStorage	1.2.840.10008.5.1.4.1.1.481.5	YES
NuclearMedicineImageStorage	1.2.840.10008.5.1.4.1.1.20	YES
LegacyConvertedEnhancedCTImageStorage	1.2.840.10008.5.1.4.1.1.2.2	YES
LegacyConvertedEnhancedMRImageStorage	1.2.840.10008.5.1.4.1.1.4.4	YES
EnhancedXAImageStorage	1.2.840.10008.5.1.4.1.1.12.1.1	YES
MultiframeGrayscaleWordSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.3	YES
DigitalMammographyXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.2.1	YES

5.2.2.2. Association Policies

Falcon MD Store-SCP AE will accept associations for Verification and C-STORE Requests. It does not initiate any associations. There are no restrictions to external AETitle. The default PDU size is 16384 bytes (minimum is 4096 bytes, maxi- mum is 131072 bytes).
Implementation Identifying Information
Falcon MD Implementation Version Name is OFFIS_DCMTK_365.

5.2.2.3. Association Initiation Policy

Falcon MD Store-SCP AE will initiate a new association to receive DICOM objects with a CSTORE command when a remote computer is connected to the local computer on the defined IP port. The proposed Presentation Contexts will match the DICOM objects that are to be offered by the remote

computer. The user can choose the priority order of the proposed Presentation Contexts in the DICOM Listener Settings screen.
The default timeout for all communications (TCP/IP and DICOM) is 30 seconds. This value can be changed by the user in the DICOM Listener Settings screen.

Accepted Presentation Contexts

Name	UID	Role
Implicit VR - Little Endian	1.2.840.10008.1.2	SCP
Explicit VR - Little Endian	1.2.840.10008.1.2.1	SCP
JPEG 2000 Image Compression, Lossless	1.2.840.10008.1.2.4.90	SCP
JPEG 2000 Image Compression, Lossy	1.2.840.10008.1.2.4.91	SCP
JPEG LS Image Compression, Lossless	1.2.840.10008.1.2.4.80	SCP
JPEG LS Image Compression, Near Lossless	1.2.840.10008.1.2.4.81	SCP
JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP

5.2.2.4. Association Acceptance Policy
Falcon MD Store-SCP will try to accept all incoming associations. There are no restrictions based on the network address or on the AETitle, for example.

5.2.3. Find-SCU, Get-SCU, Move-SCU

5.2.3.1. SOP Classes
Falcon MD Find-SCU, Get-SCU and Move-SCU provide Standard Conformance to the following DICOM 3.0 SOP Classes:

SOP Classes	UID	Role
FIND Study Root Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.2.1	SCU
MOVE Study Root Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.2.2	SCU
GET Study Root Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.2.3	SCU

C-Get-SCU, C-Move SCU SOP Classes

SOP Classes	UID	Role
ComputedRadiographyImageStorage	1.2.840.10008.5.1.4.1.1.1	SCU
DigitalXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.1	SCU
DigitalMammographyXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.2	SCU
DigitalIntraOralXRayImageStorageForPresentation	1.2.840.10008.5.1.4.1.1.1.3	SCU
CTImageStorage	1.2.840.10008.5.1.4.1.1.2	SCU
EnhancedCTImageStorage	1.2.840.10008.5.1.4.1.1.2.1	SCU

UltrasoundMultiframeImageStorage	1.2.840.10008.5.1.4.1.1.3.1	SCU
MRImageStorage	1.2.840.10008.5.1.4.1.1.4	SCU
EnhancedMRImageStorage	1.2.840.10008.5.1.4.1.1.4.1	SCU
UltrasoundImageStorage (Retired)	1.2.840.10008.5.1.4.1.1.6	SCU
UltrasoundImageStorage	1.2.840.10008.5.1.4.1.1.6.1	SCU
SecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7	SCU
MultiframeTrueColorSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.4	SCU
XRayAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.12.1	SCU
XRayRadiofluoroscopicImageStorage	1.2.840.10008.5.1.4.1.1.12.2	SCU
XRay3DAngiographicImageStorage	1.2.840.10008.5.1.4.1.1.13.1.1	SCU
VLEndoscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.1	SCU
VLMicroscopicImageStorage	1.2.840.10008.5.1.4.1.1.77.1.2	SCU
OphthalmicPhotography8BitImageStorage	1.2.840.10008.5.1.4.1.1.77.1.5.1	SCU
PositronEmissionTomographyImageStorage	1.2.840.10008.5.1.4.1.1.128	SCU
RTPlanStorage	1.2.840.10008.5.1.4.1.1.481.5	SCU
NuclearMedicineImageStorage	1.2.840.10008.5.1.4.1.1.20	SCU
LegacyConvertedEnhancedCTImageStorage	1.2.840.10008.5.1.4.1.1.2.2	SCU
LegacyConvertedEnhancedMRImageStorage	1.2.840.10008.5.1.4.1.1.4.4	SCU
EnhancedXAImageStorage	1.2.840.10008.5.1.4.1.1.12.1.1	SCU
MultiframeGrayscaleWordSecondaryCaptureImageStorage	1.2.840.10008.5.1.4.1.1.7.3	SCU
DigitalMammographyXRayImageStorageForProcessing	1.2.840.10008.5.1.4.1.1.1.2.1	SCU

5.2.3.2. Association Policies

There are no restrictions to external AETitle. The default PDU size is 16384 bytes (minimum is 4096 bytes, maximum is 131072 bytes).
Implementation Identifying Information
Falcon MD Implementation Version Name is OFFIS_DCMTK_365.

5.2.3.3. Association Initiation Policy

Find-SCU, Get-SCU, Move-SCU generate only STUDY or SERIES level queries. They don't support the PATIENT or IMAGE level query.
Falcon MD currently only supports Study Level query fields.
Falcon MD can generate C-FIND on the following DICOM fields:

- PatientsName
- PatientID
- PatientsBirthDate
- AccessionNumber
- StudyDescription
- StudyDate
- ModalitiesInStudy

5.3. NETWORK INTERFACES

5.3.1. Physical Network Interfaces

Falcon MD supports multiple network interfaces. The following physical network interfaces will be available depending on installed hardware options:

- Ethernet 1000baseT (Only iMac)
- Ethernet 100baseT (Only iMac)
- Ethernet 10baseT (Only iMac)
- WIFI 802.11 (iMac, iPad, iPhone)

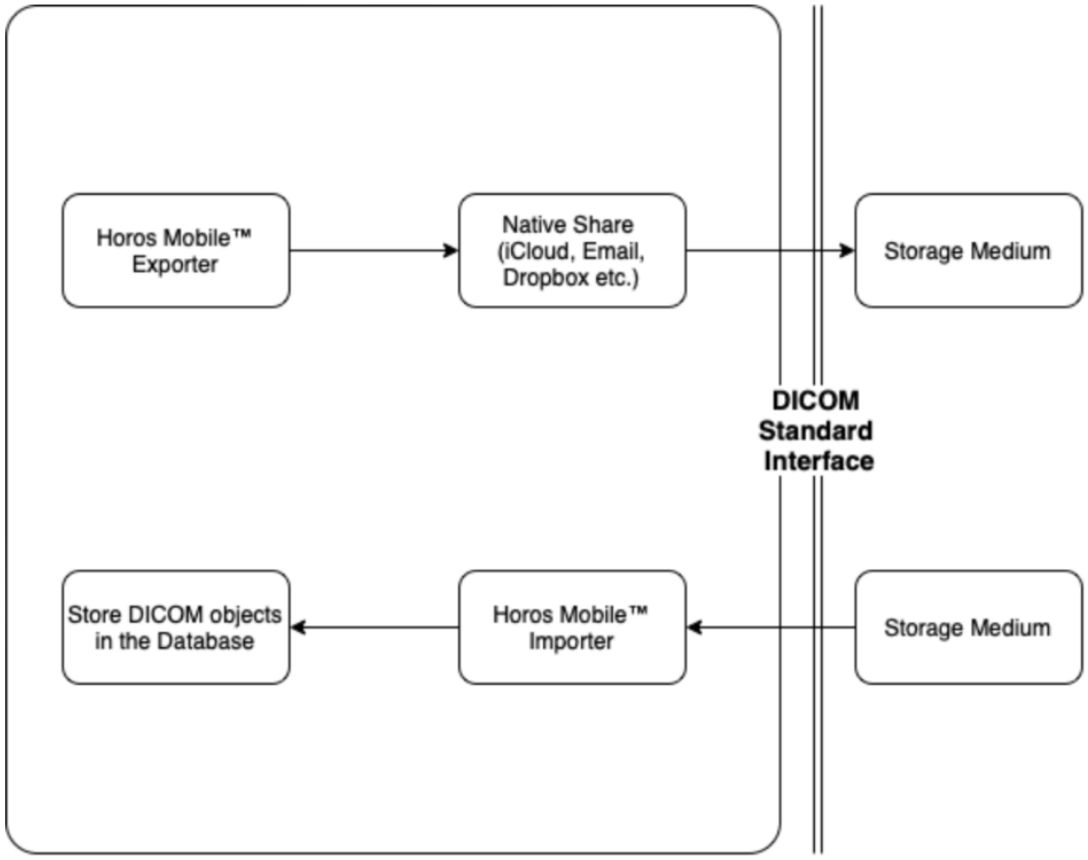
5.4. CONFIGURATION

5.4.1. AE Title/Presentation Address Mapping

All local applications use the AE Titles and TCP/IP Ports configured via DICOM Listener Settings screen in Falcon MD. The user can configure the TCP Port via the DICOM Listener Settings screen in Falcon MD. The default value for AE Titles comes from the local device name.

6. MEDIA STORAGE

6.1. IMPLEMENTATION MODEL



6.2. AE SPECIFICATIONS

6.2.1. Falcon MD Media Exporter

Falcon MD supports media export to DICOM file and JPEG image. In both cases the exporter zip them to a single file. Export can be done in both study and series level.
Falcon MD supports export to any source supported by iOS, for example: AirDrop, Messages, Mail, Drive, Save to Files etc.

6.2.2. Falcon MD Media Importer

Falcon MD can import DICOM objects from:

- Files (local drive)
- iCloud
- Google Drive
- DropBox
- URL

7. Support for Extended Character Sets

The Specific Character Set value is stored in the file DICOM Tag field (0008,0005).
Supported Character sets are:

Code	Description
ASCII	Western
UTF-8	Unicode
ISO Latin 1	Western
ISO 8859-5	Cyrillic
Windows	Cyrillic
ISO 8859-8	Hebrew

By user request, the character coding can be changed for patients.