

# DICOM Conformance Statement

MedDream

Version 8.3.1

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## 2 Introduction

### 2.1 Revision History

Version	Date	Author	Changes
1.0	2023-12-15	Tomas Burba	Document is prepared

### 2.2 Audience

This document is intended for the following:

- Potential users
- System integrators of medical equipment

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

### 2.3 Remarks

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first level validation for interoperability between different applications supporting the same DICOM functionality.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication with other vendors' medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. However, by itself it is not guaranteed to ensure the desired interoperability and successful interconnectivity with existing DICOM systems.

The user should be aware of the following important issues:

- Test procedures should be defined to validate the desired level of connectivity.
- The DICOM standard will evolve to meet the users' future requirements.

### 2.4 Definitions and Terms

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

*Table 1. Definitions and Terms*

Term	Description
Abstract Syntax	The information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Ophthalmic Photography 8 Bit Image Storage SOP Class.
Application Context	The specification of the type of communication used between Application Entities. Example: DICOM network protocol.
Application Entity (AE)	An end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages.
Application Entity Title	The externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.
Association	A network communication channel set up between Application Entities.
Attribute	A unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD)	The specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.
Module	A set of Attributes within an Information Object Definition that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.
Negotiation	First phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.
Presentation Context	The set of DICOM network services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.
Protocol Data Unit (PDU)	A packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.
Query Key	A input value for a query process. Query Keys denote the set of DICOM tags that are sent from the SCU to SCP and thus control the query result.
Service Class Provider (SCP)	Role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).
Service Class User (SCU)	Role of an Application Entity that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)
Service/Object Pair (SOP) Class	The specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.
Service/Object Pair (SOP) Instance	An information object; a specific occurrence of information exchanged in a SOP Class. Examples: a specific x-ray image.
Tag	A 32-bit identifier for a data element, represented as a pair of four-digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]
Transfer Syntax	The encoding used for exchange of DICOM information objects and messages. Examples: JPEG compressed (images), little endian explicit value representation.
Unique Identifier (UID)	A globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.
Value Representation (VR)	The format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

## 2.5 Abbreviations

The following acronyms are used in this document.

- AE — Application Entity
- AET — Application Entity Title
- DICOM — Digital Imaging and Communication in Medicine
- DIMSE — DICOM Message Service Element
- ILE — Implicit VR Little Endian
- ISO — International Standards Organization
- LUT — Look-up Table
- MWL — Modality Worklist

- NEMA — National Electrical Manufacturers Association
- PDU — Protocol Data Unit
- SCP — Storage Class Provider
- SCU — Storage Class User
- SOP — Service Object Pair
- TCP/IP — Transmission Control Protocol/Internet Protocol
- TLS — Transport Layer Security
- UID — Unique Identifier
- VR — Value Representation

## **2.6 References**

NEMA PS3 / ISO 12052, Digital Imaging and Communications in Medicine (DICOM) Standard, National Electrical Manufacturers Association, Rosslyn, VA, USA (available free at <http://medical.nema.org/>)

## 3 Networking

### 3.1 Implementation Model

#### 3.1.1 Implementation Data Flow



Figure 1. Data Flow Diagram

#### 3.1.2 Functional Definition of AEs

##### 3.1.2.1 Functional Definition of DICOM Web User Agent Application Entity

The MedDream DICOM Web User Agent Application Entity communicates to an Origin Server over HTTP/1.1 and HTTPS/1.1 using the GET method. It sends requests to a RESTful web service (Studies Web Service) and to a URI service (URI Web Service).

There are multiple uses:

- 1) implements a back-end for the Search function where the operator is provided with a set of studies matching the query request;
- 2) obtains the study metadata as a Study Metadata resource (or Study's Instances resource with relevant &includefield query parameters for a reduced metadata set);
- 3) fetches the Composite SOP Instance – either from URI Web Service as a DICOM Instance, or from Studies Web Service as an Instance resource if so configured;
- 4) stores marked Key Objects, Presentation State-based or Secondary Capture-based annotations back to the Origin Server. This, however, is an optional scenario; configuration also allows the legacy scenario where those objects are stored by the Storage Client via DIMSE.

##### 3.1.2.2 Functional Definition of Query/Retrieve Client Application Entity

The Query/Retrieve Client AE connects at the presentation address given as a Called Application Entity Title. It will propose Associations with Presentation Context for SOP Class of the Query/Retrieve Service Classes (study root FIND, study root MOVE).

When using the Client as a back-end for the Search function, the Query/Retrieve Client AE will wait on the same Association for a C-FIND response and then release the Association. The operator is provided with a set of studies matching the query request. Likewise with background use of the Client to obtain the study metadata.

When the Client is used to order retrieval of the entire study to MedDream, it will wait for a C-FIND response, then send a C-MOVE command and upon reception of its response release the Association.

##### 3.1.2.3 Functional Definition of Storage Client Application Entity

The MedDream Storage Client Application Entity is a STORAGE SCU. It connects to the presentation address configured as the Called Application Entity Title and establishes an Association with Presentation

Context of the Storage Service Class. Then it sends any supported DICOM Instances specified by the operator, over a Storage Request.

### 3.1.2.4 Functional Definition of Storage Server Application Entity

The MedDream Storage Server Application Entity waits for another application to connect at the presentation address configured for its Application Entity Title. When another application connects, the STORAGE SCP AE expects it to be a DICOM application.

The STORAGE SCP AE will accept Associations with Presentation Contexts for SOP Classes of the Verification, Instance Availability Notification and Storage Service Classes.

DICOM Instances received in a Storage Request are filed on the local (attached/mounted) file system. No any attributes from received Instances are stored anywhere except in file/directory names of the cache tree.

The received IAN N-CREATE messages are intended to control the in-advance processing and caching ("preparation") of DICOM Instances. If an Instance is referred together with Instance Availability attribute equal to "ONLINE", then a corresponding database job is created; upon its execution, a ready to use representation of the Instance is cached and will be presented faster to the end user. If an Instance is referred together with that attribute equal to "UNAVAILABLE", then references to it are removed from some kinds of cached data.

### 3.1.3 Sequencing of Real-World Activities

#### 3.1.3.1 Universal mode: DICOM ("QR") - HIS integration

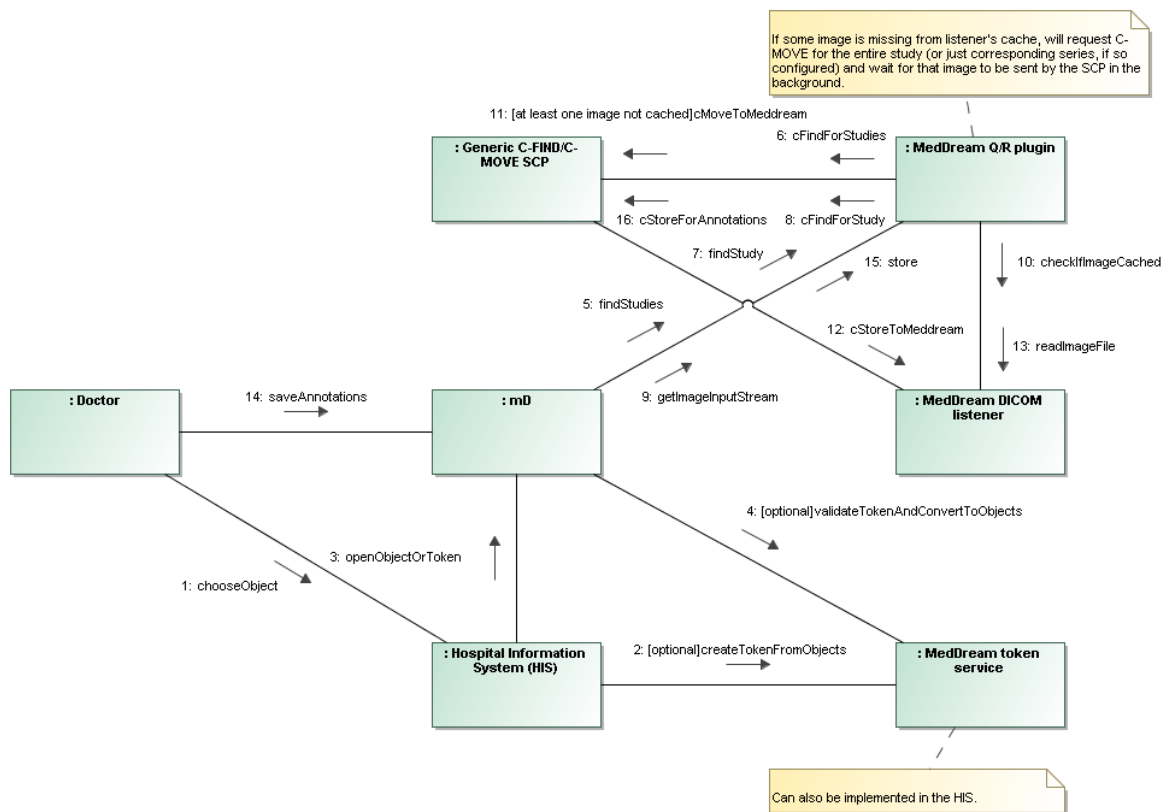


Figure 2. Universal mode: DICOM ("QR") - HIS integration

Table 2. Messages located in Universal mode: DICOM ("QR") - HIS integration

Message no.	Message	Condition	Documentation
1	chooseObject		
2	createTokenFromObjects	[optional]	
3	openObjectOrToken		The HIS presents URLs that point to MedDream and specify an object.



			Supported object types: Study UID, Patient ID, Accession Number, Accession Number + Patient ID.  If tokens are used, then a token value is passed instead. Afterwards the validator service returns "underlying" object identifiers.
4	validateTokenAndConvertToObjects	[optional]	
5	findStudies		Verifies presence: Study UID. Converts to Study UIDs: Accession Number, Accession Number + Patient ID, Patient ID.
6	cFindForStudies		
7	findStudy		Provides a hierarchical attribute tree (that represents a study structure) from study, series and image levels.
8	cFindForStudy		
9	getImageInputStream		
10	checkIfImageCached		
11	cMoveToMeddream	[at least one image not cached]	
12	cStoreToMeddream		
13	readImageFile		
14	saveAnnotations		
15	store		
16	cStoreForAnnotations		

### 3.1.3.2 Universal mode: DICOM ("QR") - interactive use

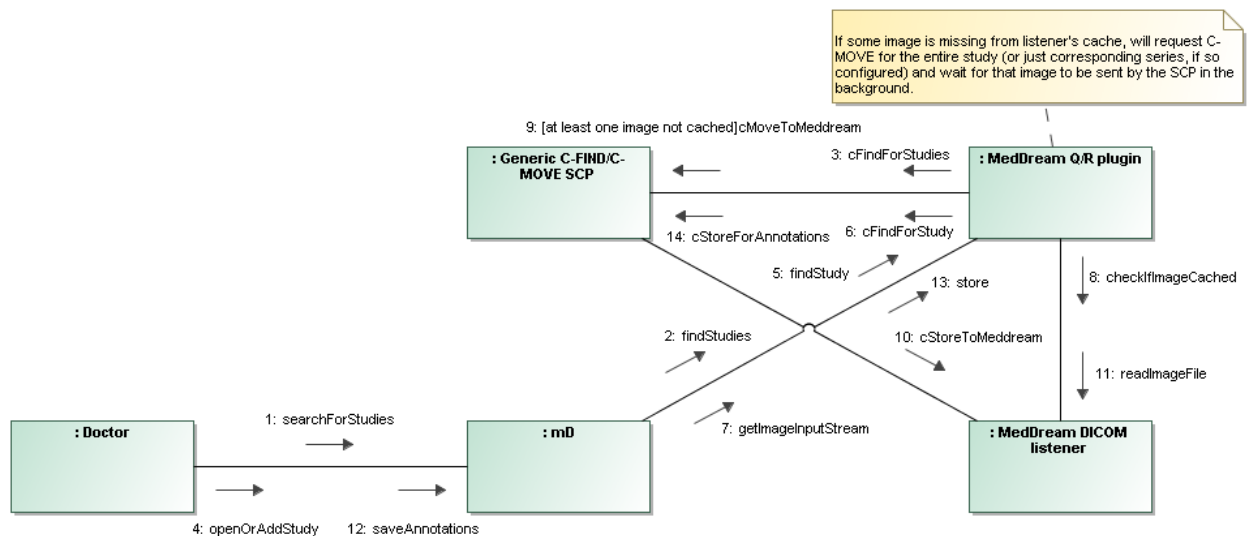


Figure 3. Universal mode: DICOM ("QR") - interactive use

Table 3. Messages located in Universal mode: DICOM ("QR") - interactive use

Message no.	Message	Condition	Documentation
1	searchForStudies		
2	findStudies		
3	cFindForStudies		
4	openOrAddStudy		
5	findStudy		Provides a hierarchical attribute tree (that represents a study structure) from study, series and image levels.
6	cFindForStudy		
7	getImageInputStream		

8	checkIfImageCached		
9	cMoveToMeddream	[at least one image not cached]	
10	cStoreToMeddream		
11	readImageFile		
12	saveAnnotations		
13	store		
14	cStoreForAnnotations		

### 3.1.3.3 Universal mode: DICOMweb - interactive use

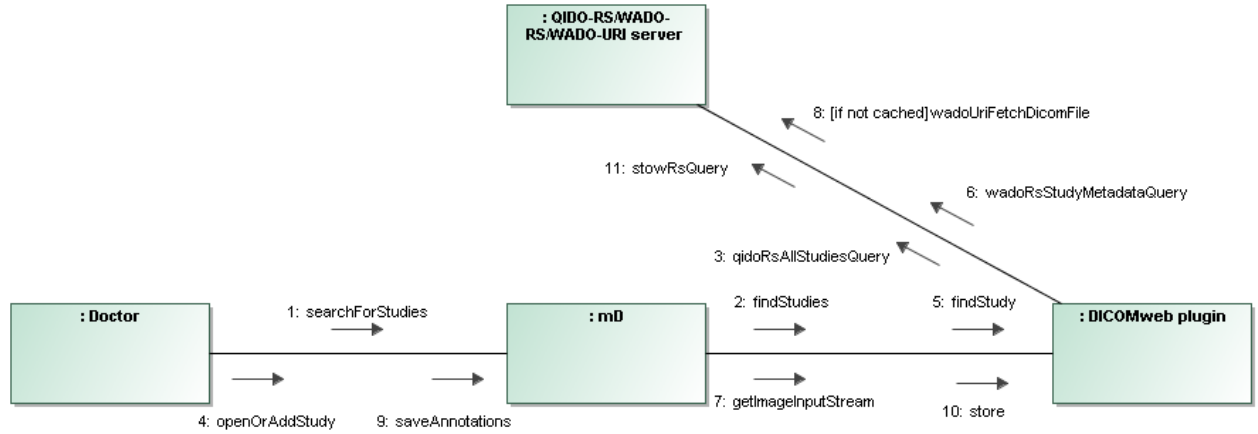


Figure 4. Universal mode: DICOMweb - interactive use

Table 4. Messages located in Universal mode: DICOMweb - interactive use

Message no.	Message	Condition	Documentation
1	searchForStudies		
2	findStudies		
3	qidoRsAllStudiesQuery		
4	openOrAddStudy		
5	findStudy		Provides a hierarchical attribute tree (that represents a study structure) from study, series and image levels.
6	wadoRsStudyMetadataQuery		Can also be replaced by a QIDO-RS query that allows to specify what attributes are to be returned.
7	getImagelInputStream		
8	wadoUriFetchDicomFile	[if not cached]	Can also use RetrievalInstance of WADO-RS.
9	saveAnnotations		
10	store		
11	stowRsQuery		

### 3.1.3.4 Universal mode: DICOMweb - HIS integration

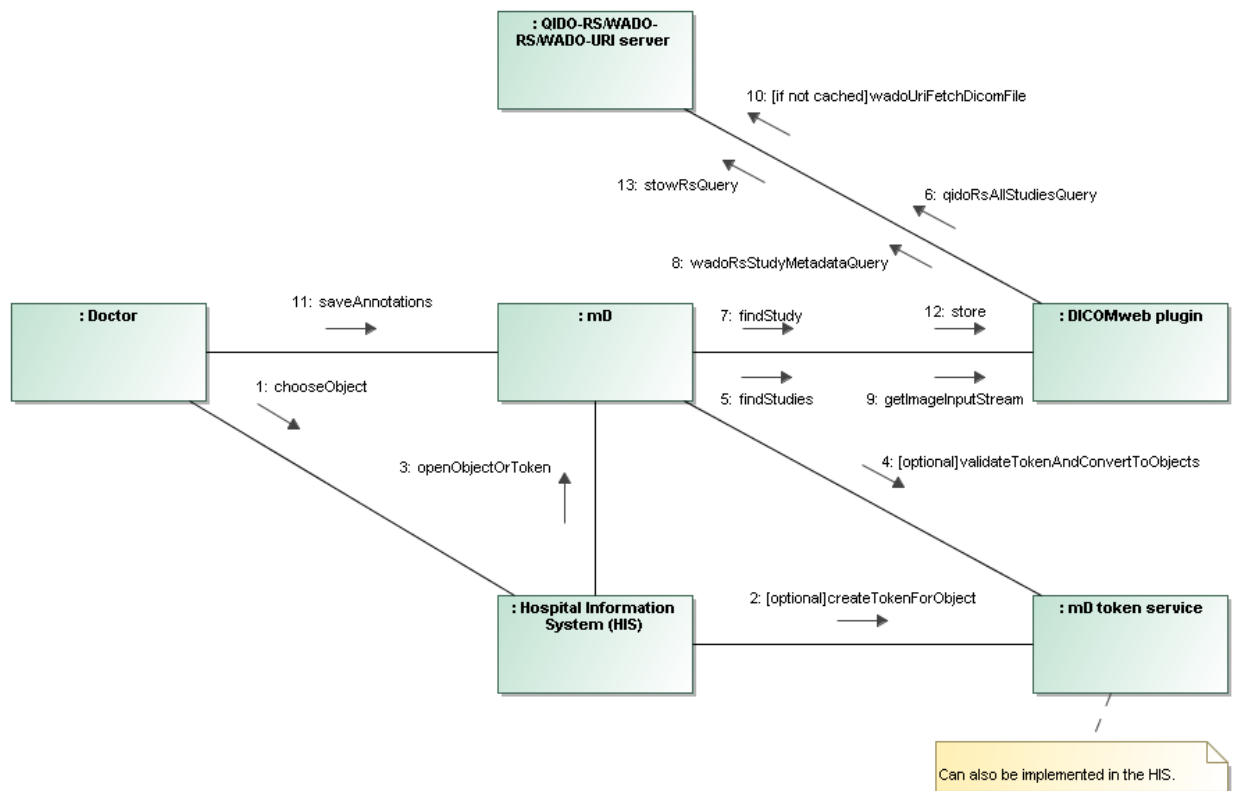


Figure 5. Universal mode: DICOMweb - HIS integration

Table 5. Messages located in Universal mode: DICOMweb - HIS integration

Message no.	Message	Condition	Documentation
1	chooseObject		
2	createTokenForObject	[optional]	
3	openObjectOrToken		The HIS presents URLs to MedDream that contain an object identifier. Supported identifier types: Study UID, Patient ID, Accession Number, Accession Number + Patient ID.  If tokens are used, then a token value is passed instead. Afterwards the token service returns "underlying" object identifiers.
4	validateTokenAndConvertToObjects	[optional]	
5	findStudies		Verifies presence: Study UID.  Converts to Study UIDs: Accession Number, Patient ID, Accession Number + Patient ID.
6	qidoRsAllStudiesQuery		
7	findStudy		Provides a hierarchical attribute tree (that represents a study structure) from study, series and image levels.
8	wadoRsStudyMetadataQuery		Can also be replaced by a QIDO-RS query that allows to specify what attributes are to be returned.
9	getImageInputStream		
10	wadoUriFetchDicomFile	[if not cached]	Can also use RetrievalInstance of WADO-RS.
11	saveAnnotations		
12	store		
13	stowRsQuery		

## 3.2 AE Specification

### 3.2.1 DICOM Web User Agent Application Entity Specification

This Application Entity implements:

- Retrieve DICOM Instance transaction (WADO-URI) with a URI Service — as User Agent;
- Retrieve transaction (WADO-RS) with a Studies Service and Resources (for Study Metadata or Instance resources) — as User Agent;
- Search transaction (QIDO-RS) with a Studies Service and Resources (for All Studies or Study's Instances resources) — as User Agent;
- Store transaction (STOW-RS) with a Studies Service and Resources (for Studies or Study resources) — as User Agent.

It does not implement any related Retrieve Capabilities Transaction.

#### 3.2.1.1 Retrieve DICOM Instance Transaction

##### 3.2.1.1.1 Description and Sequence of Activity

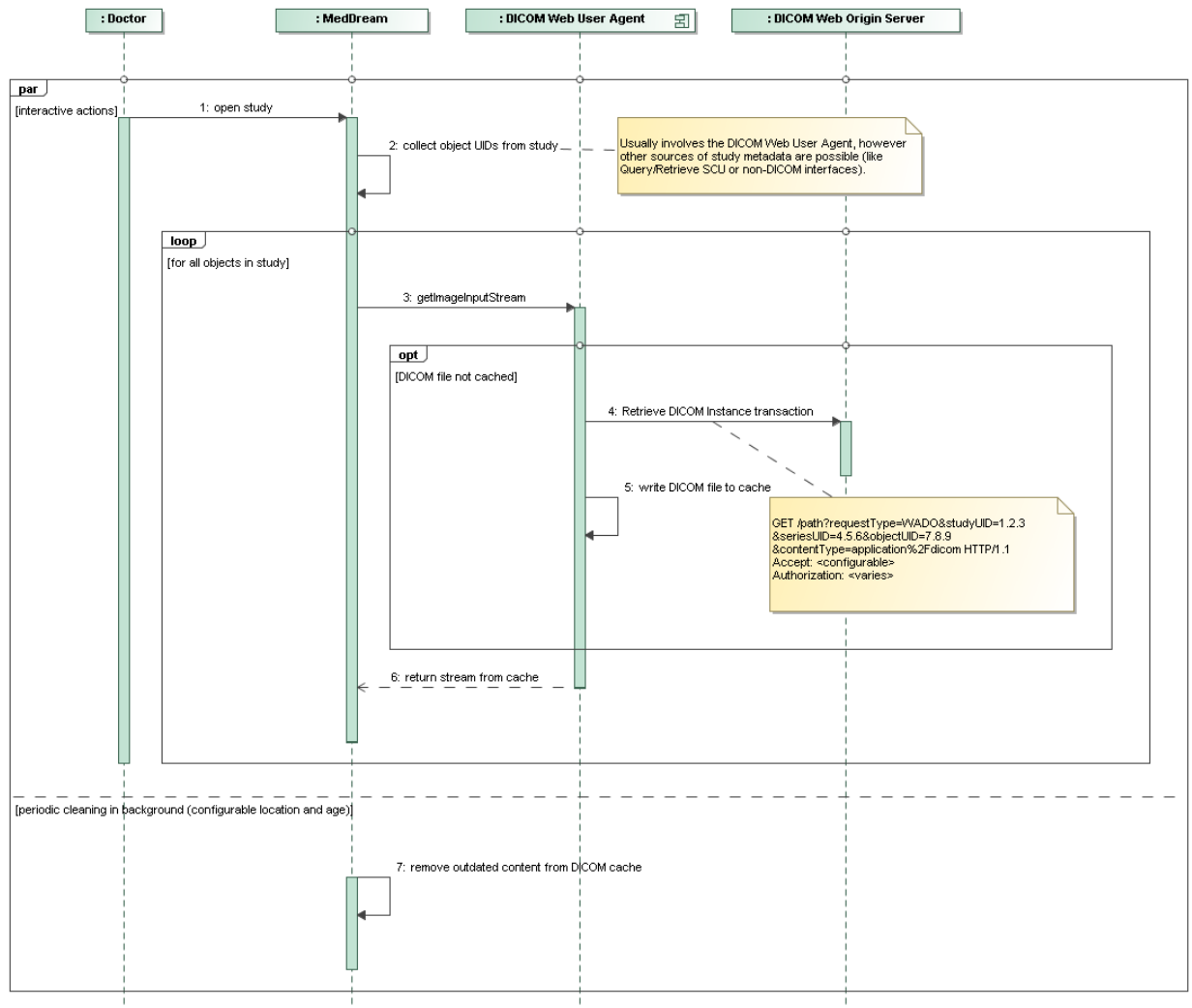


Figure 6. Place of the Retrieve DICOM Instance transaction in the workflow

In the User Agent, WADO-URI is the simplest means to fetch a DICOM file and involves configuring the wadoUriUrl setting with a base URL and optional parameters. If the dicomFileUrl setting is used instead, then it must contain the entire URL with optional parameters to a WADO-URI endpoint of an Origin Server – because the flexibility of the underlying implementation also allows to set up Retrieve Instance of WADO-RS.

If the `dicomCacheDirectory` setting is not configured, the User Agent attempts to return a network-based data stream to MedDream; this might result in multiple downloads of the same resource over a short period of time. Otherwise, the received file is cached below this directory using a hierarchical path `<Study UID>/<Series UID>/<SOP Instance UID>.dcm` with UID values used during the request. Similarly, if such a file exists before the request, its contents are used instead. Out of date cached files are removed not by User Agent but by a different part of MedDream dedicated to cleaning.

### 3.2.1.1.2 Media Types

When the Agent is configured via the `wadoUriUrl` setting, the `contentType` query parameter is added automatically and is always `application/dicom`.

When configured via the `dicomFileUrl` setting instead, then the entire URL template is provided and it should include `&contentType=application/dicom` for expected behavior of the Origin Server, if the latter doesn't provide this media type by default.

The HTTP Accept header is `application/dicom`, too; however, if the `googleCloudConfigFile` setting is present, the header changes to `application/dicom; transfer-syntax=*`. A non-default value like `*/*` can be forced via the `fileAcceptHeader` setting.

MedDream expects a DICOM Part 10 file. It does its own rendering and cannot utilize any rendered media types from the Origin Server.

### 3.2.1.1.3 Query Parameter Usage

Table 6. Query Parameters during Retrieve DICOM Instance Transaction

Key	Value
<code>requestType</code>	Always <code>WADO</code>
<code>studyUID</code>	Study Instance UID
<code>seriesUID</code>	Series Instance UID
<code>objectUID</code>	SOP Instance UID
<code>contentType</code>	Always <code>application/dicom</code>

When the Agent is configured via the `wadoUriUrl` setting, the standard query parameters listed above are added automatically.

The setting `wadoUriUrl` can also include other parameters like `transferSyntax` or even non-standard parameters. They are inserted before the automatic ones, without checking for duplicates, therefore the Origin Server will likely ignore the first occurrence.

When configured via the `dicomFileUrl` setting instead, then the entire URL template is provided and it should include the query parameters listed above for expected behavior of the Origin Server. The template supports placeholders `{study}`, `{series}` and `{image}` for dynamic values.

### 3.2.1.1.4 Header Fields

The Accept header is always added, with the default value `application/dicom`. The `fileAcceptHeader` setting can override it with something more neutral, like `*/*`.

There is no Authorization header by default. Conditions for adding it are evaluated in the following order:

- 1) If the `googleCloudConfigFile` setting is configured, then the User Agent attempts a Google Cloud service account authentication. However the subsequent WADO-URI is not supported by Google Cloud Healthcare; in such installations one must use the `dicomFileUrl` setting instead of `wadoUriUrl`.
- 2) If the `azureAuthUrl` setting is configured and the `loginUrl` is not, then the User Agent attempts the Azure cloud authentication. However the subsequent WADO-URI is not supported by Azure DICOM Service; in such installations one must use the `dicomFileUrl` setting instead of `wadoUriUrl`.
- 3) If the `loginUrl` setting is configured and `azureAuthUrl` is not, then a POST request to this address is sent, carrying HTML FORM parameters `login` from the `username` setting and `password` from the `password` setting, and expecting a cookie with name configured by the `loginCookie` setting. This cookie will be included

in all subsequent requests to the Origin Server. When the cookie expires, the authentication request is repeated automatically.

4) If only username and password settings are not empty, then they are encoded accordingly and added to the request as Authorization: Basic <encoded credentials>.

5) Otherwise, the Origin Server must accept anonymous connections.

### 3.2.1.1.5 Supported Information Objects

During the Retrieve DICOM Instance transaction, the User Agent is able to fetch and cache objects of any IOD, with any values of SOP Class and Transfer Syntax attributes; their Part 10 streams aren't parsed or otherwise verified during the network communication process. Support for IODs during later processing and rendering is beyond the scope of this chapter.

### 3.2.1.2 Retrieve Transaction

#### 3.2.1.2.1 Description and Sequence of Activity

The User Agent uses the Retrieve transaction of WADO-RS for Study Metadata, which fetches attributes of all objects in the study at once. This is the initial part of study loading. It makes known the object UIDs for subsequent fetching of DICOM files, and prepares for different display of thumbnails according to object types detected by their other DICOM attributes.

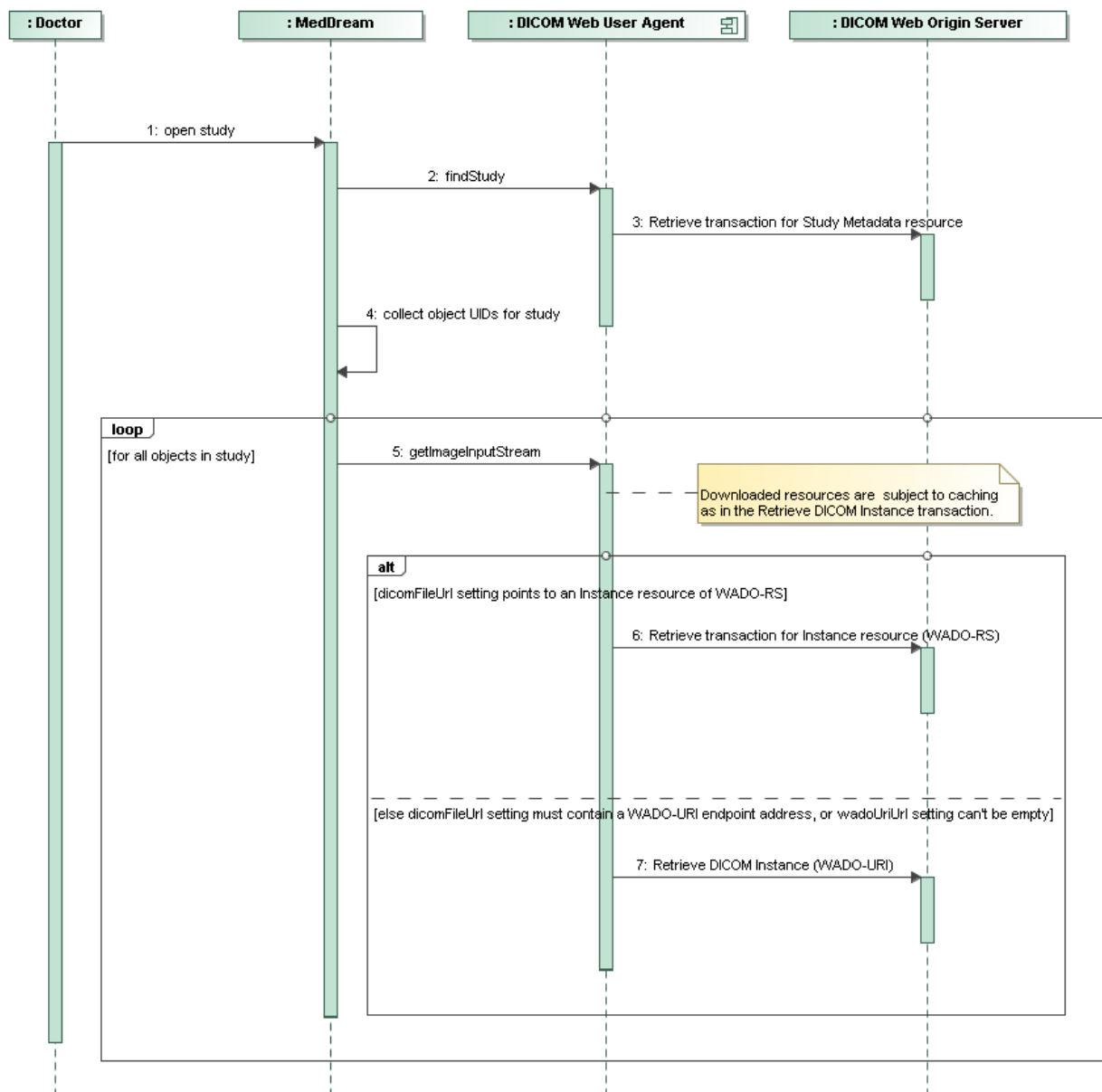


Figure 7. Places of the Retrieve transactions in the workflow

This transaction can also be used for the Instance resource as an alternative to WADO-URI. Retrieval of entire series or study in a single transaction (Series Instances resource, Study Instances resource) is not supported.

During retrieval of the Instance resource, if the `dicomCacheDirectory` setting is not configured, the User Agent attempts to return a network-based data stream to MedDream; this might result in multiple downloads of the same resource over a short period of time. Otherwise, the received file is cached below this directory using a hierarchical path `<Study UID>/<Series UID>/<SOP Instance UID>.dcm` with UID values used during the request. Similarly, if such a file exists before the request, its contents are used instead. Out of date cached files are removed not by User Agent but by a different part of MedDream dedicated to cleaning.

#### **3.2.1.2.2 Media Types**

For the Study Metadata resource, the default media type is “application/dicom+json” and the User Agent always expects a JSON stream (neither the Native DICOM Model from PS3.19, nor the encapsulation in a multipart container, are supported).

For the Instance resource, the default type is “application/dicom”, or “application/dicom; transfer-syntax=\*” if the setting `googleCloudConfigFile` is configured. The response can be either single part or multipart; the latter is detected by Content-Type response header, and the first body is always taken (regardless of part headers).

The returned Instance resource must be a DICOM Part 10 file. MedDream does its own rendering and cannot utilize any rendered media types from the Origin Server.

#### **3.2.1.2.3 Query Parameter Usage**

No query parameters are added automatically by the User Agent – neither for Study Metadata resource nor Instance resource.

The setting `wadoRsUrl` is a base URL that can include any query parameters (the remaining context path `/studies/.../metadata` is then automatically inserted, not appended). Its alternative, `studyMetaUrl`, is a full URL template with support for placeholders “{study}”, “{series}” and “{image}” in the context path, and can contain query parameters, too. The customer decides whether the Origin Server requires any non-standard parameters.

If the `dicomFileUrl` setting specifies the full URL to a WADO-RS Instance resource (`.../studies/{study}/series/{series}/instances/{image}`), then a DICOM file is fetched via a Retrieve transaction, instead of the legacy Retrieve DICOM Instance of WADO-URI.

#### **3.2.1.2.4 Header Fields**

The Accept header is always added, with values as per Media Types chapter above. The default value for Study Metadata resource can be overridden via the `metaAcceptHeader` setting. The default value for Instance resource can be configured via the `fileAcceptHeader` setting; for example, “multipart/related; type=application/dicom” would suggest the Origin Server to use a multipart container.

There is no Authorization header by default. Conditions for adding it are evaluated in the following order:

- 1) If the `googleCloudConfigFile` setting is configured, then the User Agent performs a Google Cloud service account authentication via a third-party library “google-auth-library-oauth2-http”. The obtained token is included in all subsequent requests to the Origin Server as as Authorization: Bearer <token>.

- 2) If the `azureAuthUrl` setting is configured and the `loginUrl` is not, then the User Agent performs the Azure cloud authentication. A GET (not POST) request is sent to `azureAuthUrl`, carrying HTML FORM parameters in the Body: “client\_id” from the username setting, “client\_secret” from the password setting, hardcoded values of “grant\_type” and “resource”. A JSON response is expected with fields “token\_type” (equal to “Bearer”), “expires\_in” and “access\_token”. The latter will be included in all subsequent requests to the Origin Server in form of Authorization: Bearer <token>. When the token expires, the authentication request is repeated automatically.

- 3) If the `loginUrl` setting is configured and `azureAuthUrl` is not, then a POST request to this address is sent, carrying HTML FORM parameters “login” from the username setting and “password” from the password setting, and expecting a cookie with name configured by the `loginCookie` setting. This cookie will be included

in all subsequent requests to the Origin Server. When the cookie expires, the authentication request is repeated automatically.

4) If only username and password settings are not empty, then they are encoded accordingly and added to the request as Authorization: Basic <encoded credentials>.

5) Otherwise, the Origin Server must accept anonymous connections.

#### **3.2.1.2.5 Response Payload Attribute Usage**

The following fields are expected in the Study Metadata resource:

- (0008,0020) Study Date
- (0008,0030) Study Time
- (0010,0010) Patient Name
- (0010,0020) Patient ID
- (0010,0030) Patient Birth Date
- (0008,0050) Accession Number
- (0008,0060) Modality
- (0008,1030) Study Description
- (0020,0010) Study ID
- (0008,0090) Referring Physician's Name
- (0020,000E) Series Instance UID
- (0008,103E) Series Description
- (0020,0011) Series Number
- (0008,0018) SOP Instance UID
- (0002,0010) Transfer Syntax UID
- (0008,0016) SOP Class UID
- (0028,0008) Number Of Frames
- (0020,0013) Instance Number
- a tag configured via sourceAeTitleTag setting (none by default)

Their absence will have consequences ranging from minor to fatal; a degree of importance of particular tags is not specified at the moment. Particularly, Series Instance UID and SOP Instance UID are crucial for subsequent fetching of a DICOM file.

#### **3.2.1.2.6 Supported Information Objects**

If configured to use WADO-RS Retrieve Instance for fetching of DICOM files, the User Agent is able to fetch and cache objects of any IOD, with any values of SOP Class and Transfer Syntax attributes; their Part 10 streams aren't parsed or otherwise verified during the network communication process. Support for IODs during later processing and rendering is beyond the scope of this chapter.

### **3.2.1.3 Search Transaction**

#### **3.2.1.3.1 Description and Sequence of Activity**

During an interactive login session, the Search transaction (resulting in an All Studies resource) precedes any others and allows the end user to choose the study for viewing.

Multiple transactions will be executed if the configuration parameter searchPageSize is less than 1000, as MedDream still attempts to collect 1000 results using smaller queries.

During a HIS integration session, the Search transaction resolves an object identifier like Accession Number or Patient ID to a list of Study Instance UID values. When the identifier is already a Study Instance UID in case of the "insecure" URL integration, then the transaction at least verifies presence of the object and is important for protection against unauthorized access.

Due to a flexible implementation, the Search transaction can also be used for fetching study metadata as Study's Instances resource of QIDO-RS (an alternative to Study Metadata of WADO-RS), as this provides a chance to improve performance by requesting only relevant DICOM Attributes.



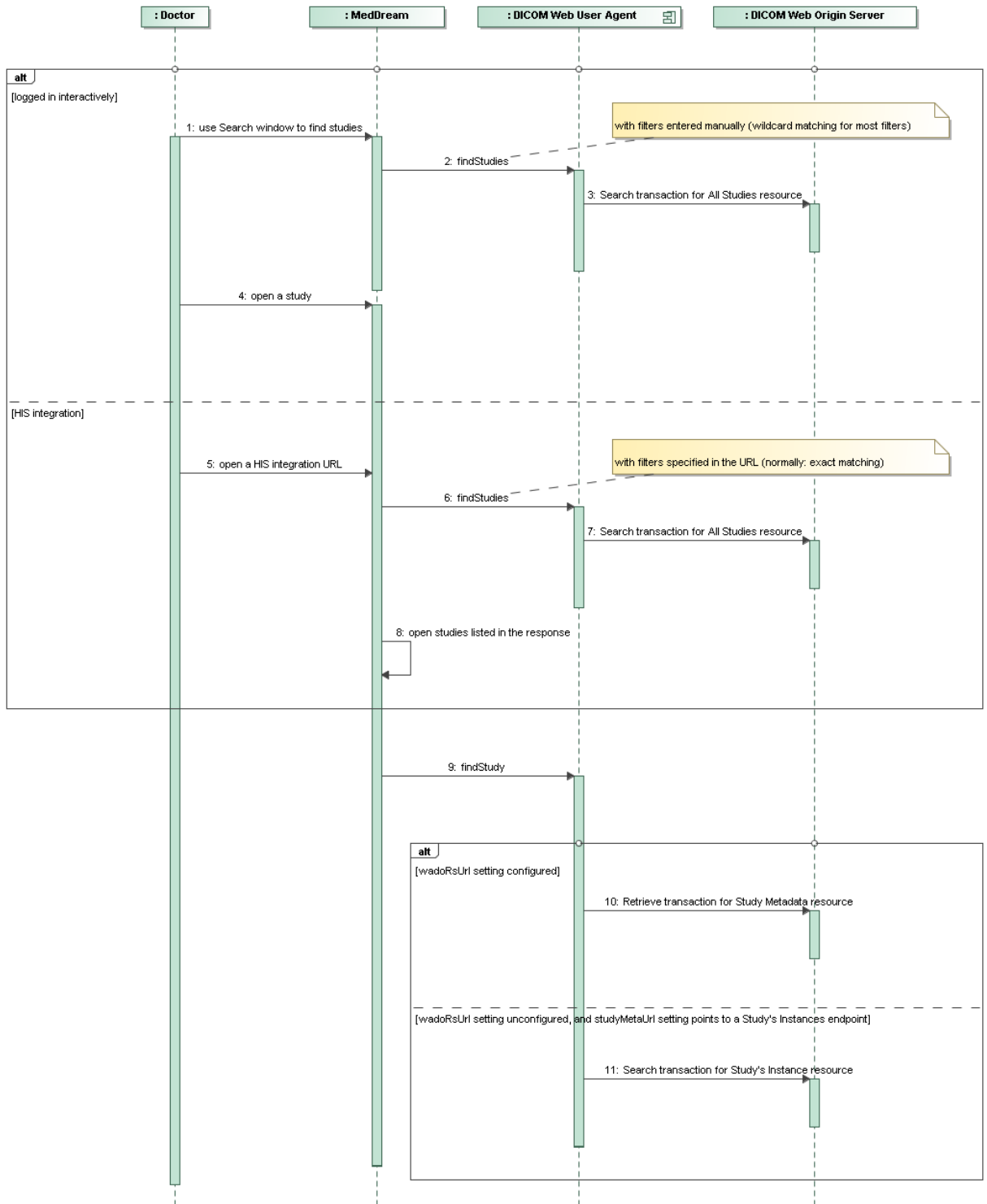


Figure 8. Places of the Search transactions in the workflow

### 3.2.1.3.2 Media Types

The default media type is “application/dicom+json” and can be modified via the metaAcceptHeader setting. The User Agent always expects a JSON stream; neither the Native DICOM Model from PS3.19 nor the encapsulation in a multipart container are supported.

### 3.2.1.3.3 Query Parameter Usage

Table 7. Query Parameters during Search Transaction

Key	Value
limit	Equal to the setting searchPageSize. The default is "200" if Azure authentication is configured, and "1000" otherwise.
offset	If the setting searchPageSize is less than 1000, then multiple requests are made with value of "offset" parameter increasing

	accordingly, until the response contains less than searchPageSize results or 1000 results in total are collected. Otherwise, this parameter is not sent.
includefield	Multiple occurrences with possible values of 0020000D, 00080020, 00080030, 00100010, 00100020, 00100030, 00080050, 00080061, 00081030, 00200010, 00080090. Can also include hexadecimal values of settings sourceAeTitleTag and studyReceivedDateTag if those are configured.
00100020	When a Patient Name filter is entered in the Search window: its value, automatically surrounded by "*" characters.
00100010	When a Patient ID filter is entered in the Search window: its value, automatically surrounded by "*" characters.  When the viewer is being opened from HIS with a Patient ID filter: the exact value of the filter.  The strictSearchIsEnabled setting can force presence/absence of "*" characters in both cases.
00080061	Value of the Modality filter is in the Search window. By default, the "*" characters are not present (exact match). If the otherStrictSearchTags setting is modified and does not contain the number 524384, then the filter value is surrounded by "*" (substring match).
00080020	When a Study Date filter is entered in the Search window: a two-sided or one-sided date range (depending on whether both date fields are present), delimited by a hyphen character. Format: FROM-TO, FROM-, -TO.
00081030	When a Study Description filter is entered in the Search window: its value, automatically surrounded by "*" characters.
00080050	When an Accession Number filter is entered in the Search window: its value, automatically surrounded by "*" characters.  When the viewer is being opened from HIS with an Accession Number filter: the exact value of the filter.  The strictSearchIsEnabled setting can force presence/absence of "*" characters in both cases.
0020000D	When the viewer is opened from HIS with a Study UID filter: the exact value of the filter.
(Hexadecimal value of setting sourceAeTitleTag)	When sourceAeTitleTag is configured, and a Source AE Title filter is entered in the Search window: value of the filter, automatically surrounded by "*" characters. The "*" characters are not added if otherStrictSearchTags setting is modified and contains the same value as in sourceAeTitleTag.

The query parameters listed above are added automatically when fetching an All Studies resource.

The qidoRsUrl setting is a base URL that can also include other standard parameters like fuzzymatching, or even non-standard parameters. They are inserted before the automatic ones, without checking for duplicates, therefore the Origin Server will likely ignore the first occurrence.

If the wadoRsUrl setting remains unconfigured and the studyMetaUrl setting is used instead, then the source of study metadata is not Study Metadata resource of WADO-RS but Study's Instances resource of QIDO-RS. As studyMetaUrl is a full URL template that supports the "{study}" placeholder, in this case it should contain a typical value for Study's Instances, like ../studies/{study}/instances?includefield=00080020&... No query parameters are added automatically to studyMetaUrl, the customer is responsible for the entire URL. For the minimum set of includefield values, see Response Payload Attribute Usage under Retrieve Transaction.

#### 3.2.1.3.4 Header Fields

The Accept header is always added, with value of "application/dicom+json" (can be overridden via the metaAcceptHeader setting).

There is no Authorization header by default. Conditions for adding it are evaluated in the following order:

- 1) If the googleCloudConfigFile setting is configured, then the User Agent performs a Google Cloud service account authentication via a third-party library "google-auth-library-oauth2-http". The obtained token is included in all subsequent requests to the Origin Server as as Authorization: Bearer <token>.
- 2) If the azureAuthUrl setting is configured and the loginUrl is not, then the User Agent performs the Azure cloud authentication. A GET (not POST) request is sent to azureAuthUrl, carrying HTML FORM parameters in the Body: "client\_id" from the username setting, "client\_secret" from the password setting, hardcoded values of "grant\_type" and "resource". A JSON response is expected with fields "token\_type" (equal to "Bearer"), "expires\_in" and "access\_token". The latter will be included in all subsequent requests to the Origin Server in form of Authorization: Bearer <token>. When the token expires, the authentication request is repeated automatically.
- 3) If the loginUrl setting is configured and azureAuthUrl is not, then a POST request to this address is sent, carrying HTML FORM parameters "login" from the username setting and "password" from the password setting, and expecting a cookie with name configured by the loginCookie setting. This cookie will be included in all subsequent requests to the Origin Server. When the cookie expires, the authentication request is repeated automatically.
- 4) If only username and password settings are not empty, then they are encoded accordingly and added to the request as Authorization: Basic <encoded credentials>.
- 5) Otherwise, the Origin Server must accept anonymous connections.

#### 3.2.1.3.5 Response Payload Attribute Usage

The following fields are expected in the All Studies resource:

- (0020,000D) Study Instance UID
- (0008,0020) Study Date
- (0008,0030) Study Time
- (0010,0010) Patient Name
- (0010,0020) Patient ID
- (0010,0030) Patient Birth Date
- (0008,0050) Accession Number
- (0008,0061) Modalities In Study
- (0008,1030) Study Description
- (0020,0010) Study ID
- (0008,0090) Referring Physician's Name
- a tag configured via sourceAeTitleTag setting (none by default)
- a tag configured via studyReceivedDateTag setting (none by default)

Their absence might result in undefined behavior; a degree of importance of particular tags is not specified at the moment. At least Study Instance UID is needed for subsequent opening of the study.

For a list of fields expected in the Study's Instances resource, see Response Payload Attribute Usage under Retrieve Transaction.

#### 3.2.1.4 Store Transaction

##### 3.2.1.4.1 Description and Sequence of Activity

The User Agent uses the Store transaction of STOW-RS for uploading new objects (DICOM-formatted annotations) back to the Origin Server. It sends a single instance in DICOM Part 10 format.

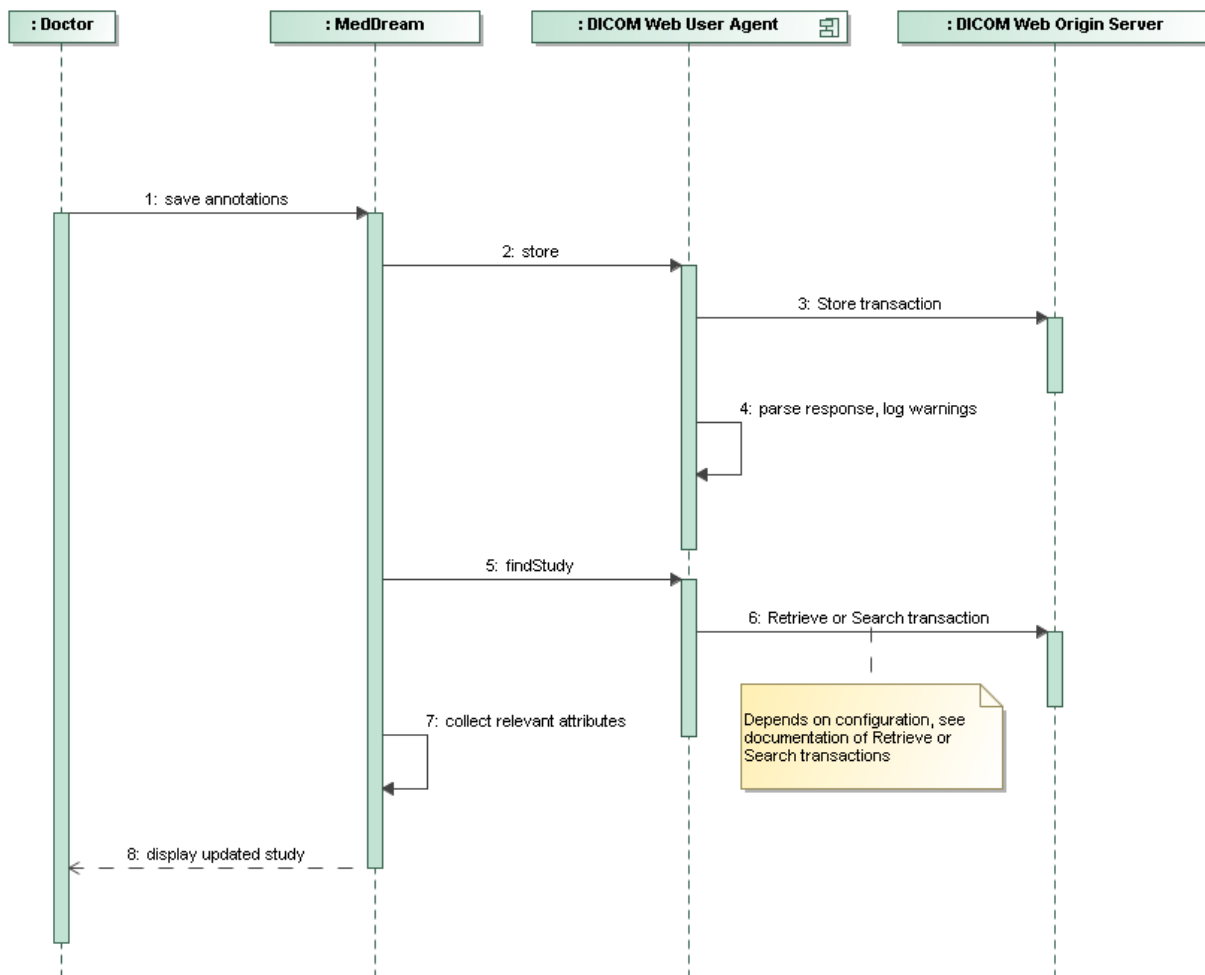


Figure 9. Places of the Store transactions in the workflow

### 3.2.1.4.2 Query Parameter Usage

No query parameters are added automatically by the User Agent.

A substring “/studies/{study}” is automatically added to the value of stowRsUrl and later the {study} placeholder is replaced with Study Instance UID extracted from the object being uploaded. This kind of URL instructs the Origin Server to validate the Study Instance UID attribute in the object being uploaded, although there is no benefit in doing so. In contrast, the alternative setting uploadUrl is a template for a ready to use URL; if that validation is needed due to requirements of the Origin Server, then the setting must contain the corresponding substring, and vice versa.

### 3.2.1.4.3 Header Fields

The Accept header is always added. The default value is “application/dicom+json” and can be overridden via the metaAcceptHeader setting.

There is no Authorization header by default. Conditions for adding it are evaluated in the following order:

- 1) If the googleCloudConfigFile setting is configured, then the User Agent performs a Google Cloud service account authentication via a third-party library “google-auth-library-oauth2-http”. The obtained token is included in all subsequent requests to the Origin Server as as Authorization: Bearer <token>.

- 2) If the azureAuthUrl setting is configured and the loginUrl is not, then the User Agent performs the Azure cloud authentication. A GET (not POST) request is sent to azureAuthUrl, carrying HTML FORM parameters in the Body: “client\_id” from the username setting, “client\_secret” from the password setting, hardcoded values of “grant\_type” and “resource”. A JSON response is expected with fields “token\_type” (equal to “Bearer”), “expires\_in” and “access\_token”. The latter will be included in all subsequent requests to the Origin Server in form of Authorization: Bearer <token>. When the token expires, the authentication request is repeated automatically.

3) If the loginUrl setting is configured and azureAuthUrl is not, then a POST request to this address is sent, carrying HTML FORM parameters "login" from the username setting and "password" from the password setting, and expecting a cookie with name configured by the loginCookie setting. This cookie will be included in all subsequent requests to the Origin Server. When the cookie expires, the authentication request is repeated automatically.

4) If only username and password settings are not empty, then they are encoded accordingly and added to the request as Authorization: Basic <encoded credentials>.

5) Otherwise, the Origin Server must accept anonymous connections.

#### 3.2.1.4.4 Response Payload Attribute Usage

An HTTP Status code 200 or 204 is treated as a success indicator. Additionally, a non-empty Body must contain a valid JSON stream with a PS 3.19-formatted object structure. If it's (0008,1199) Referenced SOP Sequence > (0008,1196) Warning Reason, then the first element of the latter is logged for reference (not displayed to the end user).

### 3.2.2 Query/Retrieve Client Application Entity Specification

#### 3.2.2.1 SOP Classes

Application Entity provides Standard Conformance to the following SOP Classes:

Table 8. SOP Classes for Query/Retrieve Client AE

SOP Class Name	SOP Class UID	SCU	SCP
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	YES	NO
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	YES	NO

#### 3.2.2.2 Associations Policies

##### 3.2.2.2.1 General

At a command from the operator, the MedDream Query/Retrieve Client AE attempts to establish an association with the specified Remote AE. When the association is established, a C-FIND request is made to retrieve a list of studies using the defined matching keys, or metadata of a study using its Study Instance UID. In the second case, after the response confirms existence of the study, an additional C-MOVE sub-request might be made to order the transfer of the entire study to the MedDream Storage Server AE. The MedDream Query/Retrieve Client waits for any C-FIND response. The established association remains active until a C-FIND response from the remote AE indicates the end of requested data items, or until a timeout period expires.

The MedDream Query/Retrieve Client AE itself does not accept Associations.

The DICOM standard application context name for DICOM 3.0 is always accepted and proposed:

Table 9. DICOM application context name for Query/Retrieve Client AE

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

##### 3.2.2.2.2 Number of Associations

Only a single Association is active at the moment. The results are displayed to the operator only after receiving them from SCP entirely.

##### 3.2.2.2.3 Asynchronous Nature

The Query/Retrieve Client does not support asynchronous communication (multiple outstanding transactions over a single Association).

##### 3.2.2.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 10. DICOM Implementation Class and Version for Query/Retrieve Client AE

Implementation Class UID	1.2.826.0.1.3680043.2.60.0.1
Implementation Version Name	jdt270_6004

#### 3.2.2.3 Association Initiation Policy

### 3.2.2.3.1 Activity - All interactions

#### 3.2.2.3.1.1 Description and Sequence of Activity

Table 11. Query/Retrieve Client Supported Elements

Tag and Attribute Name	VR	Query key	Modifiable	Displayed in GUI
(0008,0020) Study Date	DA	X	X	X
(0008,0030) Study Time	TM	—	—	X
(0008,0050) Accession Number	SH	C	X	X
(0008,0052) Query/Retrieve Level	CS	X	—	—
(0008,0061) Modalities In Study	CS	X	X	X
(0008,1030) Study Description	LO	P	X	—
(0010,0010) Patient's Name	PN	P	X	X
(0010,0020) Patient ID	LO	C	X	X
(0020,000D) Study Instance UID	UI	X	—	—

The attributes listed above can be requested in a query. The corresponding matching keys are empty if the operator didn't specify a particular value; it's not possible to search for an empty value.

Legend:

X = Always an exact match.

P = Always a partial match (value is automatically enclosed by "\*" characters).

C = Partial match (automatically enclosed by "\*" characters) when searching interactively, or exact match when used as a study identifier in HIS integration scenarios.

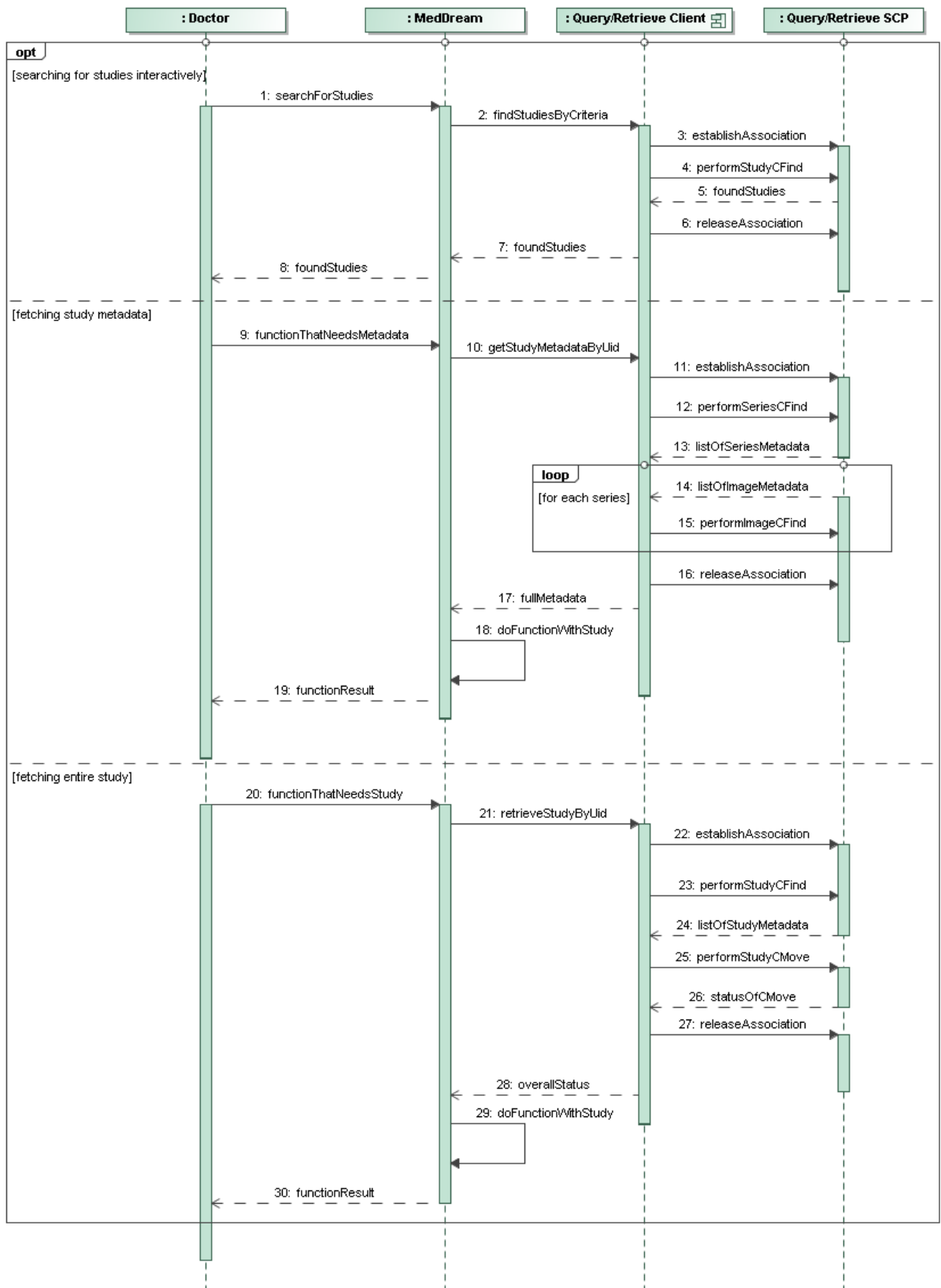


Figure 10. All interactions

### 3.2.2.3.1.2 Proposed Presentation Contexts

Table 12. Proposed Presentation Contexts for Query/Retrieve Client AE

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCU	None
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCU	None

### 3.2.2.3.1.3 SOP Specific Conformance for SOP Classes

Table 13. Query/Retrieve Client Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	This is the last response and the Client will release the Association after collecting results.
Pending	Matching is continuing	FF00	The Client waits for another response.

Table 14. Query/Retrieve Client Communication Failure Behavior

Exception	Behavior
Association aborted by the SCP or the network layers indicate communication loss (i.e., low-level TCP/IP socket closure)	Error message is output to the application logs.

## 3.2.3 Storage Client Application Entity Specification

### 3.2.3.1 SOP Classes

Application Entity provides Standard Conformance to the following SOP Classes:

Table 15. SOP Classes for Storage Client AE

SOP Class Name	SOP Class UID	SCU	SCP
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	YES	NO
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	YES	NO
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	YES	NO
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	YES	NO
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	YES	NO
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	YES	NO
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	YES	NO
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	YES	NO
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	YES	NO
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	YES	NO
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.2	YES	NO
Digital Mammography X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	YES	NO
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	YES	NO
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	YES	NO
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	YES	NO
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	YES	NO
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	YES	NO
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	YES	NO
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	YES	NO
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	YES	NO
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.2	YES	NO
Legacy Converted Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.4	YES	NO
Legacy Converted Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.128.1	YES	NO
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	YES	NO
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	YES	NO
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	YES	NO
Multiframe True Color Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7.4	YES	NO



Storage			
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	YES	NO
Ophthalmic Photography 8-Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	YES	NO
Ophthalmic Photography 16-Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	YES	NO
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	YES	NO
Private Philips 3D Presentation State Storage	1.3.46.670589.2.5.1.1	YES	NO
Private Siemens CSA Non-Image Storage	1.3.12.2.1107.5.9.1	YES	NO
Radiation Therapy Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	YES	NO
Radiation Therapy Image Storage	1.2.840.10008.5.1.4.1.1.481.1	YES	NO
Radiation Therapy Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	YES	NO
Radiation Therapy Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	YES	NO
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	YES	NO
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	YES	NO
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	YES	NO
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	YES	NO
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	YES	NO
Ultrasound Multiframe Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	YES	NO
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	YES	NO
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	YES	NO
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	YES	NO
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	YES	NO
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	YES	NO
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	YES	NO
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	YES	NO
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	YES	NO

### 3.2.3.2 Associations Policies

#### 3.2.3.2.1 General

The Storage Client AE proposes Association Requests for the Storage Service.

The DICOM standard application context name for DICOM 3.0 is always accepted and proposed:

Table 16. DICOM application context name for Storage Client AE

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

#### 3.2.3.2.2 Number of Associations

Only a single Association is active at the moment. DICOM instances are sent one at a time.

#### 3.2.3.2.3 Asynchronous Nature

The Storage Client does not support asynchronous communication (multiple outstanding transactions over a single Association).

#### 3.2.3.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 17. DICOM Implementation Class and Version for Storage Client AE

Implementation Class UID	1.2.826.0.1.3680043.2.60.0.1
Implementation Version Name	jdt270_6004

### 3.2.3.3 Association Initiation Policy

### 3.2.3.3.1 Activity - All interactions

#### 3.2.3.3.1.1 Description and Sequence of Activity

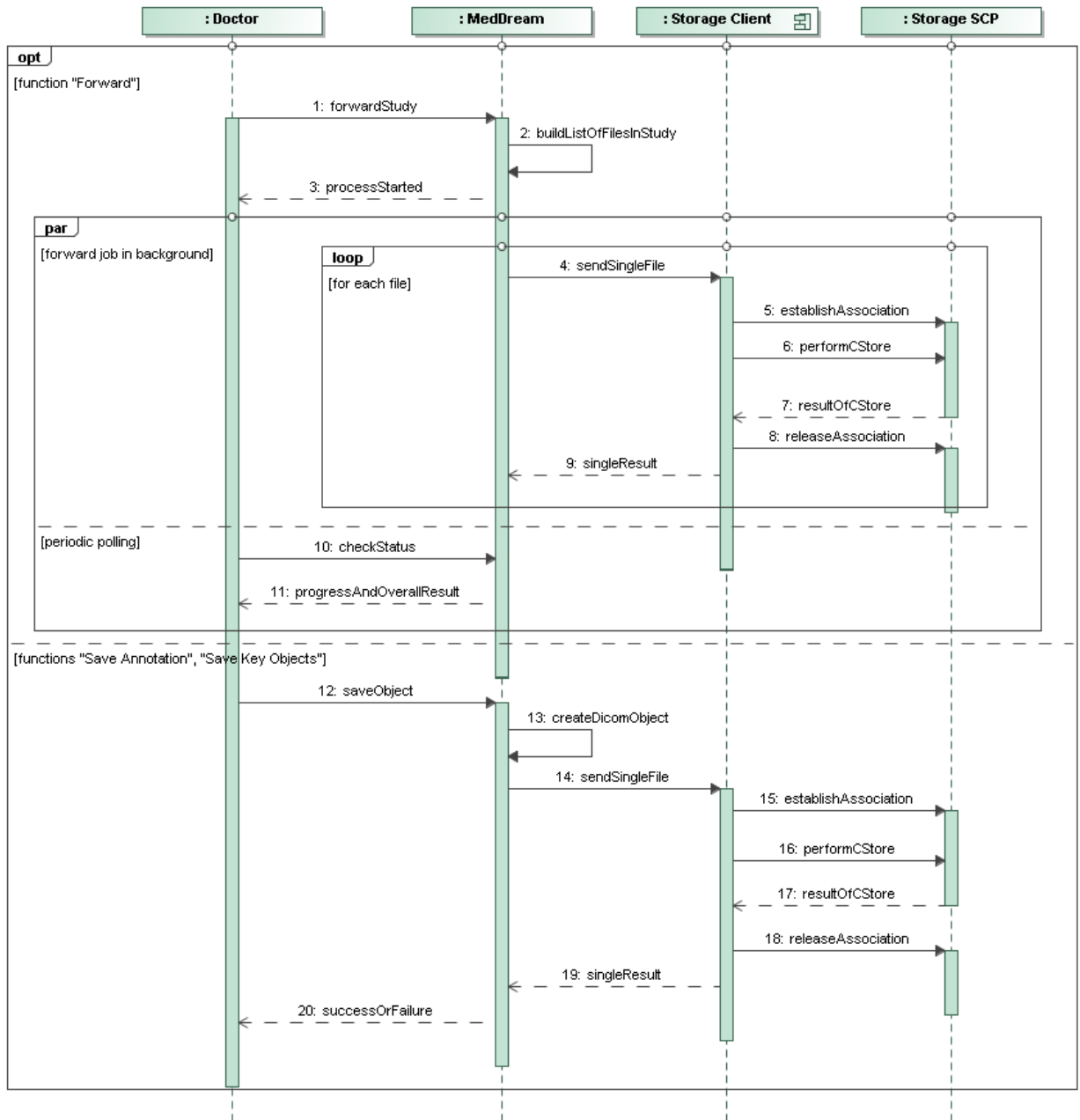


Figure 11. All interactions

#### 3.2.3.3.1.2 Proposed Presentation Contexts

Table 18. Proposed Presentation Contexts for Storage Client AE

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCU	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCU	None
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

Breast Tomosynthesis Image Storage	1.2.840.10008.5 .1.4.1.1.13.1.3	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5 .1.4.1.1.11.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Comprehensive SR	1.2.840.10008.5 .1.4.1.1.88.33	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCU	None
CR Image Storage	1.2.840.10008.5 .1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
CR Image Storage	1.2.840.10008.5 .1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
CR Image Storage	1.2.840.10008.5 .1.4.1.1.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCU	None
CR Image Storage	1.2.840.10008.5 .1.4.1.1.1	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCU	None
CR Image Storage	1.2.840.10008.5 .1.4.1.1.1	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90	SCU	None
CR Image Storage	1.2.840.10008.5 .1.4.1.1.1	JPEG Baseline (Processes 2 & 4)	1.2.840.10008.1.2.4.51	SCU	None
CR Image Storage	1.2.840.10008.5 .1.4.1.1.1	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
CR Image Storage	1.2.840.10008.5 .1.4.1.1.1	JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCU	None
CR Image Storage	1.2.840.10008.5 .1.4.1.1.1	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81	SCU	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCU	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCU	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90	SCU	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	JPEG Lossless, Nonhierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCU	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCU	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81	SCU	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	RLE Lossless	1.2.840.10008.1.2.5	SCU	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCU	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCU	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90	SCU	None

Presentation					
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCU	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCU	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	RLE Lossless	1.2.840.100 08.1.2.5	SCU	None
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.2	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.2	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.2	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCU	None
Digital Mammography X-Ray Image Storage – for Processing	1.2.840.10008.5 .1.4.1.1.1.2.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Digital Mammography X-Ray Image Storage – for Processing	1.2.840.10008.5 .1.4.1.1.1.2.1	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	Explicit VR Big Endian	1.2.840.100 08.1.2.2	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	JPEG 2000 Image Compression	1.2.840.100 08.1.2.4.91	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	JPEG 2000 Image Compression (Lossless Only)	1.2.840.100 08.1.2.4.90	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	RLE Lossless	1.2.840.100 08.1.2.5	SCU	None
Encapsulated PDF Storage	1.2.840.10008.5 .1.4.1.1.104.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Encapsulated PDF Storage	1.2.840.10008.5 .1.4.1.1.104.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Enhanced MR Image Storage	1.2.840.10008.5 .1.4.1.1.4.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Enhanced MR Image Storage	1.2.840.10008.5 .1.4.1.1.4.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Enhanced SR	1.2.840.10008.5 .1.4.1.1.88.22	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Enhanced SR	1.2.840.10008.5 .1.4.1.1.88.22	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Enhanced US Volume Storage	1.2.840.10008.5 .1.4.1.1.6.2	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCU	None
General ECG	1.2.840.10008.5	Explicit VR Little Endian	1.2.840.100	SCU	None

Waveform Storage	.1.4.1.1.9.1.2		08.1.2.1		
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5 .1.4.1.1.11.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5 .1.4.1.1.11.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Key Object Selection Document	1.2.840.10008.5 .1.4.1.1.88.59	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5 .1.4.1.1.2.2	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Legacy Converted Enhanced MR Image Storage	1.2.840.10008.5 .1.4.1.1.4.4	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Legacy Converted Enhanced PET Image Storage	1.2.840.10008.5 .1.4.1.1.128.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Mammography CAD SR	1.2.840.10008.5 .1.4.1.1.88.50	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	JPEG 2000 Image Compression	1.2.840.100 08.1.2.4.91	SCU	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	JPEG Lossless, Nonhierarchical (Process 14)	1.2.840.100 08.1.2.4.57	SCU	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCU	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	JPEG-LS Lossless Image Compression	1.2.840.100 08.1.2.4.80	SCU	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.100 08.1.2.4.81	SCU	None
MR Spectroscopy Storage	1.2.840.10008.5 .1.4.1.1.4.2	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7.4	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7.4	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCU	None
NM Image Storage	1.2.840.10008.5 .1.4.1.1.20	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
NM Image Storage	1.2.840.10008.5 .1.4.1.1.20	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCU	None
Ophthalmic Photography 8-Bit Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.5.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Ophthalmic Photography 8-Bit Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.5.1	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCU	None
Ophthalmic Photography 16-Bit Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.5.2	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Ophthalmic Tomography Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.5.4	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Private Philips 3D Presentation State Storage	1.3.46.670589.2 .5.1.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Private Siemens CSA	1.3.12.2.1107.5	Explicit VR Little Endian	1.2.840.100	SCU	None

Non-Image Storage	9.1		08.1.2.1		
Radiation Therapy Dose Storage	1.2.840.10008.5 .1.4.1.1.481.2	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Radiation Therapy Image Storage	1.2.840.10008.5 .1.4.1.1.481.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Radiation Therapy Plan Storage	1.2.840.10008.5 .1.4.1.1.481.5	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Radiation Therapy Structure Set Storage	1.2.840.10008.5 .1.4.1.1.481.3	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Raw Data Storage	1.2.840.10008.5 .1.4.1.1.66	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	Explicit VR Big Endian	1.2.840.100 08.1.2.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG 2000 Image Compression	1.2.840.100 08.1.2.4.91	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG 2000 Image Compression (Lossless Only)	1.2.840.100 08.1.2.4.90	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG Baseline (Processes 2 & 4)	1.2.840.100 08.1.2.4.51	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG-LS Lossless Image Compression	1.2.840.100 08.1.2.4.80	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.100 08.1.2.4.81	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.100 08.1.2.4.10 3	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	MPEG2 Main Profile Main Level	1.2.840.100 08.1.2.4.10 0	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	RLE Lossless	1.2.840.100 08.1.2.5	SCU	None
Ultrasound Image Storage	1.2.840.10008.5 .1.4.1.1.6.1	Explicit VR Big Endian	1.2.840.100 08.1.2.2	SCU	None
Ultrasound Image Storage	1.2.840.10008.5 .1.4.1.1.6.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Ultrasound Image Storage	1.2.840.10008.5 .1.4.1.1.6.1	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCU	None
Ultrasound Image Storage	1.2.840.10008.5 .1.4.1.1.6.1	JPEG Baseline (Processes 2 & 4)	1.2.840.100 08.1.2.4.51	SCU	None
Ultrasound Image Storage	1.2.840.10008.5 .1.4.1.1.6.1	RLE Lossless	1.2.840.100 08.1.2.5	SCU	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5 .1.4.1.1.6	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5 .1.4.1.1.6	JPEG Lossless, Nonhierarchical (Process 14)	1.2.840.100 08.1.2.4.57	SCU	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5 .1.4.1.1.6	JPEG Lossless, Nonhierarchical (Process 28)	1.2.840.100 08.1.2.4.65	SCU	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5 .1.4.1.1.3.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5 .1.4.1.1.3.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5 .1.4.1.1.3.1	JPEG 2000 Image Compression (Lossless Only)	1.2.840.100 08.1.2.4.90	SCU	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5 .1.4.1.1.3.1	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCU	None

Ultrasound Multiframe Image Storage	1.2.840.10008.5 .1.4.1.1.3.1	RLE Lossless	1.2.840.100 08.1.2.5	SCU	None
Ultrasound Multiframe Image Storage (Retired)	1.2.840.10008.5 .1.4.1.1.3	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
Video Endoscopic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.1.1	MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.100 08.1.2.4.10 2	SCU	None
Video Endoscopic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.1.1	MPEG2 Main Profile High Level	1.2.840.100 08.1.2.4.10 1	SCU	None
Video Endoscopic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.1.1	MPEG2 Main Profile Main Level	1.2.840.100 08.1.2.4.10 0	SCU	None
Video Photographic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.4.1	MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.100 08.1.2.4.10 3	SCU	None
Video Photographic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.4.1	MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.100 08.1.2.4.10 2	SCU	None
Video Photographic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.4.1	MPEG2 Main Profile High Level	1.2.840.100 08.1.2.4.10 1	SCU	None
VL Endoscopic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.1	MPEG2 Main Profile Main Level	1.2.840.100 08.1.2.4.10 0	SCU	None
VL Photographic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.4	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.6	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5 .1.4.1.1.12.1	Explicit VR Big Endian	1.2.840.100 08.1.2.2	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5 .1.4.1.1.12.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5 .1.4.1.1.12.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5 .1.4.1.1.12.1	JPEG 2000 Image Compression	1.2.840.100 08.1.2.4.91	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5 .1.4.1.1.12.1	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCU	None
X-Ray Radiation Dose SR	1.2.840.10008.5 .1.4.1.1.88.67	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5 .1.4.1.1.12.2	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5 .1.4.1.1.12.2	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCU	None

### 3.2.3.3.1.3 SOP Specific Conformance for SOP Classes

Table 19. Storage Client Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The Composite SOP Instance was successfully received and stored in the system repository by the SCP. Proceed to next step.
Warning	Data Element Coercion	B000	The SCP has corrected some Data Element(s) to avoid a conflict. Warning indication message is output to the logs. Assume that the Instance has been stored successfully and proceed to next step.
Warning	Elements Discarded	B006	Some Data Element(s) were discarded by the SCP. Warning indication message is output to the logs. Assume that the

			Instance has been stored successfully and proceed to next step
Warning	Data Set does not match SOP Class	B007	Assume that the SCP has stored the Instance anyway. Warning indication message is output to the logs. Proceed to next step.
Error	Others	Others	Any unrecognized Error Code is considered an indication that the Instance wasn't stored. Error indication message is output to the logs. Do not include the Instance in the number of transferred Instances and their summary size but still proceed to the next step.

Table 20. Storage Client Communication Failure Behavior

Exception	Behavior
Association aborted by the SCP or the network layers indicate communication loss (i.e., low-level TCP/IP socket closure)	Error message is output to the application logs.

## 3.2.4 Storage Server Application Entity Specification

### 3.2.4.1 SOP Classes

Application Entity provides Standard Conformance to the following SOP Classes:

Table 21. SOP Classes for Storage Server AE

SOP Class Name	SOP Class UID	SCU	SCP
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	NO	YES
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	NO	YES
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	NO	YES
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	NO	YES
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	NO	YES
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	NO	YES
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	NO	YES
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	NO	YES
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	NO	YES
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	NO	YES
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	NO	YES
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.2	NO	YES
Digital Mammography X-Ray Image Storage – for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	NO	YES
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	NO	YES
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	NO	YES
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	NO	YES
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	NO	YES
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	NO	YES
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	NO	YES
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	NO	YES
Instance Availability Notification SOP Class	1.2.840.10008.5.1.4.33	NO	YES
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	NO	YES
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.2	NO	YES
Legacy Converted Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.4	NO	YES
Legacy Converted Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.128.1	NO	YES
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	NO	YES
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	NO	YES
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	NO	YES
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	NO	YES
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	NO	YES



Ophthalmic Photography 8-Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	NO	YES
Ophthalmic Photography 16-Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	NO	YES
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	NO	YES
Private Philips 3D Presentation State Storage	1.3.46.670589.2.5.1.1	NO	YES
Private Siemens CSA Non-Image Storage	1.3.12.2.1107.5.9.1	NO	YES
Radiation Therapy Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	NO	YES
Radiation Therapy Image Storage	1.2.840.10008.5.1.4.1.1.481.1	NO	YES
Radiation Therapy Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	NO	YES
Radiation Therapy Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	NO	YES
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	NO	YES
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	NO	YES
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	NO	YES
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	NO	YES
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	NO	YES
Ultrasound Multiframe Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	NO	YES
Verification SOP Class	1.2.840.10008.1.1	NO	YES
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	NO	YES
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	NO	YES
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	NO	YES
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	NO	YES
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	NO	YES
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	NO	YES
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	NO	YES
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	NO	YES

### 3.2.4.2 Associations Policies

#### 3.2.4.2.1 General

The Storage Server AE accepts Association Requests for the Storage Service, Verification Service and Instance Availability Notification Service.

The DICOM standard application context name for DICOM 3.0 is always accepted and proposed:

Table 22. DICOM application context name for Storage Server AE

Application Context Name	1.2.840.10008.3.1.1.1
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#### 3.2.4.2.2 Number of Associations

The number of supported parallel associations can be adjusted, and is 5 by default. This is a socket-level limitation; any more attempts (up to 50 in parallel) to connect to the service port will wait indefinitely.

#### 3.2.4.2.3 Asynchronous Nature

The Storage Server does not support asynchronous communication (multiple outstanding transactions over a single Association).

#### 3.2.4.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 23. DICOM Implementation Class and Version for Storage Server AE

Implementation Class UID	1.2.826.0.1.3680043.2.60.0.1
Implementation Version Name	jdt270_6004

### 3.2.4.3 Association Initiation Policy

#### 3.2.4.3.1 Activity - All interactions

##### 3.2.4.3.1.1 Description and Sequence of Activity

If configured, the Storage Server is always running in background, regardless of user's actions.

It replies to Verification requests at any time.

It always listens for Storage requests. If a supported Presentation Context is offered, the corresponding Composite Object is stored below the cache directory. This can be a result of either a C-MOVE request from the Query/Retrieve Client in MedDream (which shortly afterwards finds the stored object in the cache), or a

standalone decision from the SCP to forward the object to MedDream in advance (and therefore the C-MOVE request can be avoided).

It always listens for Instance Availability Notification requests.

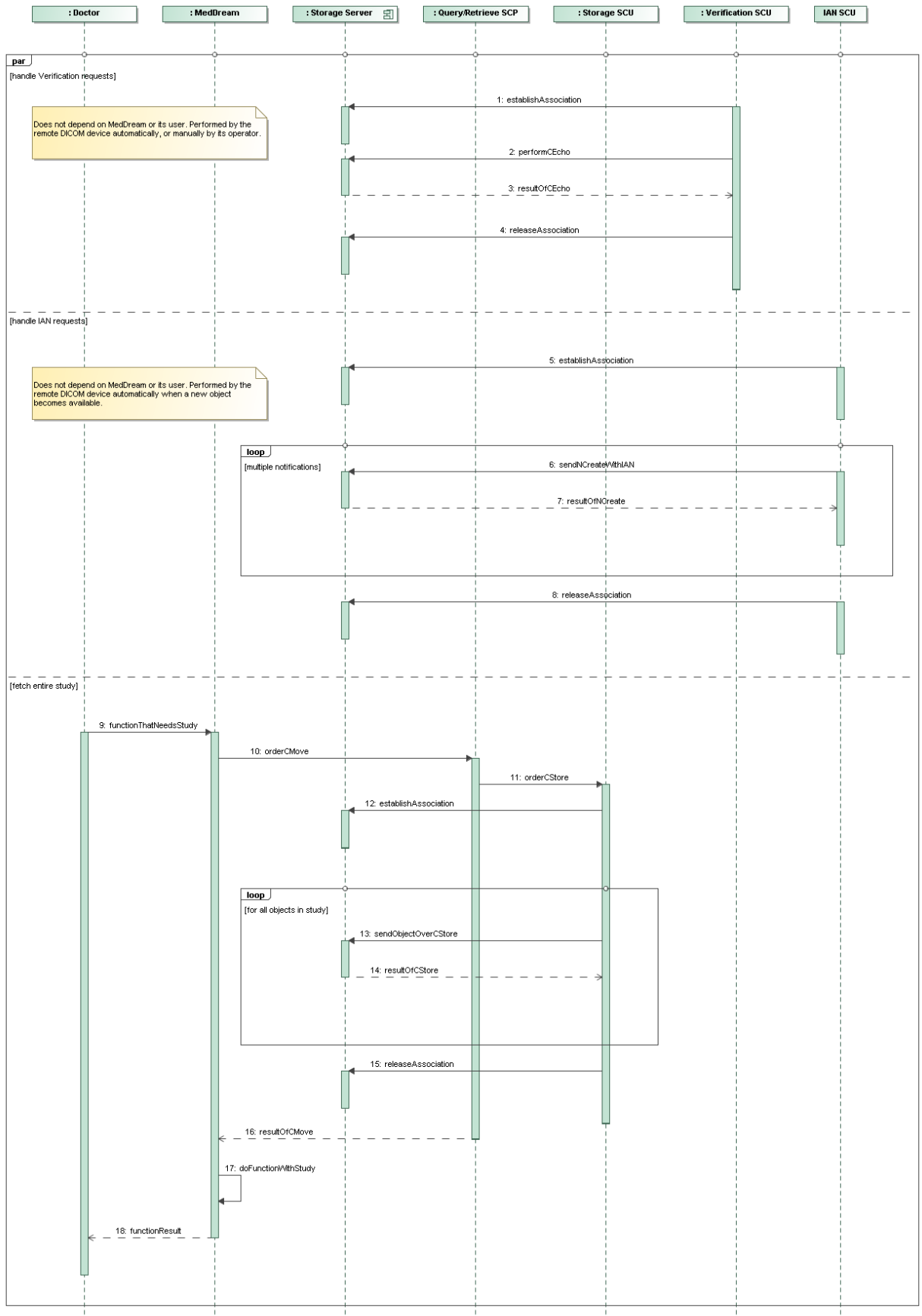


Figure 12. All interactions

3.2.4.3.1.2 Proposed Presentation Contexts

Table 24. Proposed Presentation Contexts for Storage Server AE

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name	UID		
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCP	None
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90	SCP	None
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	JPEG Baseline (Processes 2 & 4)	1.2.840.10008.1.2.4.51	SCP	None
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP	None
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
CT Image Storage	1.2.840.10008.5	JPEG Lossless,	1.2.840.100	SCP	None

	.1.4.1.1.2	Nonhierarchical (Process 14)	08.1.2.4.57		
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCP	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	JPEG-LS Lossless Image Compression	1.2.840.100 08.1.2.4.80	SCP	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.100 08.1.2.4.81	SCP	None
CT Image Storage	1.2.840.10008.5 .1.4.1.1.2	RLE Lossless	1.2.840.100 08.1.2.5	SCP	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	Explicit VR Big Endian	1.2.840.100 08.1.2.2	SCP	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	JPEG 2000 Image Compression	1.2.840.100 08.1.2.4.91	SCP	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	JPEG 2000 Image Compression (Lossless Only)	1.2.840.100 08.1.2.4.90	SCP	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCP	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCP	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.3	RLE Lossless	1.2.840.100 08.1.2.5	SCP	None
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.2	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.2	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.2	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCP	None
Digital Mammography X-Ray Image Storage – for Processing	1.2.840.10008.5 .1.4.1.1.1.2.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Digital Mammography X-Ray Image Storage – for Processing	1.2.840.10008.5 .1.4.1.1.1.2.1	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	Explicit VR Big Endian	1.2.840.100 08.1.2.2	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	JPEG 2000 Image Compression	1.2.840.100 08.1.2.4.91	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	JPEG 2000 Image Compression (Lossless Only)	1.2.840.100 08.1.2.4.90	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5 .1.4.1.1.1.1	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5	RLE Lossless	1.2.840.100	SCP	None

for Presentation	.1.4.1.1.1.1		08.1.2.5		
Encapsulated PDF Storage	1.2.840.10008.5 .1.4.1.1.104.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Encapsulated PDF Storage	1.2.840.10008.5 .1.4.1.1.104.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Enhanced MR Image Storage	1.2.840.10008.5 .1.4.1.1.4.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Enhanced MR Image Storage	1.2.840.10008.5 .1.4.1.1.4.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Enhanced SR	1.2.840.10008.5 .1.4.1.1.88.22	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Enhanced SR	1.2.840.10008.5 .1.4.1.1.88.22	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Enhanced US Volume Storage	1.2.840.10008.5 .1.4.1.1.6.2	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCP	None
General ECG Waveform Storage	1.2.840.10008.5 .1.4.1.1.9.1.2	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5 .1.4.1.1.11.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5 .1.4.1.1.11.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Instance Availability Notification SOP Class	1.2.840.10008.5 .1.4.33	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Key Object Selection Document	1.2.840.10008.5 .1.4.1.1.88.59	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5 .1.4.1.1.2.2	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Legacy Converted Enhanced MR Image Storage	1.2.840.10008.5 .1.4.1.1.4.4	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Legacy Converted Enhanced PET Image Storage	1.2.840.10008.5 .1.4.1.1.128.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Mammography CAD SR	1.2.840.10008.5 .1.4.1.1.88.50	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	JPEG 2000 Image Compression	1.2.840.100 08.1.2.4.91	SCP	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	JPEG Lossless, Nonhierarchical (Process 14)	1.2.840.100 08.1.2.4.57	SCP	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	JPEG Lossless, Nonhierarchical, First- Order Prediction	1.2.840.100 08.1.2.4.70	SCP	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	JPEG-LS Lossless Image Compression	1.2.840.100 08.1.2.4.80	SCP	None
MR Image Storage	1.2.840.10008.5 .1.4.1.1.4	JPEG-LS Lossy (Near- Lossless) Image Compression	1.2.840.100 08.1.2.4.81	SCP	None
MR Spectroscopy Storage	1.2.840.10008.5 .1.4.1.1.4.2	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7.4	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7.4	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCP	None

NM Image Storage	1.2.840.10008.5 .1.4.1.1.20	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
NM Image Storage	1.2.840.10008.5 .1.4.1.1.20	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCP	None
Ophthalmic Photography 8-Bit Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.5.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Ophthalmic Photography 8-Bit Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.5.1	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCP	None
Ophthalmic Photography 16-Bit Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.5.2	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Ophthalmic Tomography Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.5.4	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Private Philips 3D Presentation State Storage	1.3.46.670589.2 .5.1.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Private Siemens CSA Non-Image Storage	1.3.12.2.1107.5. 9.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Radiation Therapy Dose Storage	1.2.840.10008.5 .1.4.1.1.481.2	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Radiation Therapy Image Storage	1.2.840.10008.5 .1.4.1.1.481.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Radiation Therapy Plan Storage	1.2.840.10008.5 .1.4.1.1.481.5	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Radiation Therapy Structure Set Storage	1.2.840.10008.5 .1.4.1.1.481.3	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Raw Data Storage	1.2.840.10008.5 .1.4.1.1.66	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	Explicit VR Big Endian	1.2.840.100 08.1.2.2	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG 2000 Image Compression	1.2.840.100 08.1.2.4.91	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG 2000 Image Compression (Lossless Only)	1.2.840.100 08.1.2.4.90	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG Baseline (Processes 2 & 4)	1.2.840.100 08.1.2.4.51	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.100 08.1.2.4.70	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG-LS Lossless Image Compression	1.2.840.100 08.1.2.4.80	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.100 08.1.2.4.81	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.100 08.1.2.4.10 3	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	MPEG2 Main Profile Main Level	1.2.840.100 08.1.2.4.10 0	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5 .1.4.1.1.7	RLE Lossless	1.2.840.100 08.1.2.5	SCP	None
Ultrasound Image Storage	1.2.840.10008.5	Explicit VR Big Endian	1.2.840.100	SCP	None

	.1.4.1.1.6.1		08.1.2.2		
Ultrasound Image Storage	1.2.840.10008.5 .1.4.1.1.6.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Ultrasound Image Storage	1.2.840.10008.5 .1.4.1.1.6.1	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCP	None
Ultrasound Image Storage	1.2.840.10008.5 .1.4.1.1.6.1	JPEG Baseline (Processes 2 & 4)	1.2.840.100 08.1.2.4.51	SCP	None
Ultrasound Image Storage	1.2.840.10008.5 .1.4.1.1.6.1	RLE Lossless	1.2.840.100 08.1.2.5	SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5 .1.4.1.1.6	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5 .1.4.1.1.6	JPEG Lossless, Nonhierarchical (Process 14)	1.2.840.100 08.1.2.4.57	SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5 .1.4.1.1.6	JPEG Lossless, Nonhierarchical (Process 28)	1.2.840.100 08.1.2.4.65	SCP	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5 .1.4.1.1.3.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5 .1.4.1.1.3.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5 .1.4.1.1.3.1	JPEG 2000 Image Compression (Lossless Only)	1.2.840.100 08.1.2.4.90	SCP	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5 .1.4.1.1.3.1	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCP	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5 .1.4.1.1.3.1	RLE Lossless	1.2.840.100 08.1.2.5	SCP	None
Ultrasound Multiframe Image Storage (Retired)	1.2.840.10008.5 .1.4.1.1.3	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
Verification SOP Class	1.2.840.10008.1 .1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.1.1	MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.100 08.1.2.4.10 2	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.1.1	MPEG2 Main Profile High Level	1.2.840.100 08.1.2.4.10 1	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.1.1	MPEG2 Main Profile Main Level	1.2.840.100 08.1.2.4.10 0	SCP	None
Video Photographic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.4.1	MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.100 08.1.2.4.10 3	SCP	None
Video Photographic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.4.1	MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.100 08.1.2.4.10 2	SCP	None
Video Photographic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.4.1	MPEG2 Main Profile High Level	1.2.840.100 08.1.2.4.10 1	SCP	None
VL Endoscopic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.1	MPEG2 Main Profile Main Level	1.2.840.100 08.1.2.4.10 0	SCP	None
VL Photographic Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.4	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5 .1.4.1.1.77.1.6	JPEG Baseline (Process 1)	1.2.840.100 08.1.2.4.50	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5 .1.4.1.1.12.1	Explicit VR Big Endian	1.2.840.100 08.1.2.2	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5 .1.4.1.1.12.1	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None

X-Ray Angiographic Image Storage	1.2.840.10008.5 .1.4.1.1.12.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5 .1.4.1.1.12.1	JPEG 2000 Image Compression	1.2.840.100 08.1.2.4.91	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5 .1.4.1.1.12.1	JPEG Lossless, Nonhierarchical, First- Order Prediction	1.2.840.100 08.1.2.4.70	SCP	None
X-Ray Radiation Dose SR	1.2.840.10008.5 .1.4.1.1.88.67	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5 .1.4.1.1.12.2	Explicit VR Little Endian	1.2.840.100 08.1.2.1	SCP	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5 .1.4.1.1.12.2	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.100 08.1.2	SCP	None

### 3.2.4.3.1.3 SOP Specific Conformance for SOP Classes

Table 25. Storage Server Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The Composite SOP Instance was successfully received, verified, and stored in the system repository.
Error	Processing Failure	0110	Some internal error prevented creation of a background job from an Instance Availability Notification message. The appropriate Status will be sent in the N-CREATE Response. Error indication message is output to the application log.
Error	Missing Attribute	0120	The Instance Availability Notification message doesn't contain a mandatory DICOM attribute. The appropriate Status will be sent in the N-CREATE Response. Error indication message is output to the application log.
Error	Missing Attribute Value	0121	Some DICOM attribute in the Instance Availability Notification message is empty. The appropriate Status will be sent in the N-CREATE Response. Error indication message is output to the application log.
Error	Out of Resources	A700	This status is returned due to internal errors such as a processing failure response from a file system operation. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the application log.

Table 26. Storage Server Communication Failure Behavior

Exception	Behavior
Association aborted by the SCU or the network layers indicate communication loss (i.e., low-level TCP/IP socket closure)	Error message is output to the application logs.

## 3.3 Network Interfaces

DICOM Upper Layer over TCP/IP is supported by:

- Query/Retrieve Client
- Storage Client
- Storage Server

HTTP and HTTPS are supported by:

- DICOM Web User Agent

### 3.3.1 Physical Network Interface

MedDream is indifferent to the physical medium over which TCP/IP executes. It inherits the TCP/IP stack from the operating system.

### 3.3.2 Additional Protocols

No additional protocols are supported.



### 3.3.3 IPv4 and IPv6 Support

Only IPv4 is explicitly supported and was tested.

## 3.4 Configuration

### 3.4.1 AE Title/Presentation Address Mapping

#### 3.4.1.1 Local AE Titles

Application Entity	Default AE Title	Default TCP/IP Port
Query/Retrieve Client	MEDDREAM	not applicable
Storage Client	MEDDREAM	not applicable
Storage Server	MEDDREAM	11116

#### 3.4.1.2 Remote AE Title

The remote AE Titles and TCP ports are configurable in application settings.

### 3.4.2 Parameters

MedDream configuration parameters relevant to DICOM communication are as follows.

Table 27. Configuration Parameter Table

Parameter	Configurable (Yes/No)	Default Value
<b>DICOM Web User Agent AE</b>		
Search page size	Yes	1000 (or 200 if Azure authentication is configured)
strictSearchIsEnabled: use of wildcards in query keys 00100010 (Patient ID) and 00080050 (Accession Number)	Yes	No value = wildcards are added when searching interactively, and not added when opening an object via HIS integration.
otherStrictSearchTags: usage of wildcards for Modality and source AE title	Yes	524384 = wildcards are not added to Modality and are added to source AE title
multivalueSeparatorIsComma: multiple values of the Modalities In Study search key are separated by commas	Yes	false = multiple values are separated by backslashes
Value of Accept header during Retrieve transaction for Instance resource and during Retrieve DICOM Instance transaction	Yes	application/json
Value of Accept header during Retrieve transaction for Study Metadata resource and during Search transaction	Yes	application/dicom
Value of Accept header during Store transaction	Yes	application/json
<b>Query/Retrieve Client AE</b>		
Bind to port	No	none
Proposed Calling AET	Yes	MEDDREAM
Proposed Called AET	Yes	administrator's choice
Maximum PDU size the AE can receive	No	32768
Maximum PDU size the AE can send	No	32768
Time-out for receiving A-ASSOCIATE-AC	No	no timeout (note 1)
Time-out for receiving C-FIND-RSP	No	no timeout (note 1)
Time-out for receiving C-MOVE-RSP	No	no timeout (note 1)
Time-out for TCP connect	No	no timeout (note 1)
Time-out for receiving A-RELEASE-RP	No	no timeout (note 1)
Support for the Basic TLS Secure Transport Connection Profile	No	unsupported
Accepted TLS ciphers	No	-
<b>Storage Client AE</b>		
Bind to port	No	none
Proposed Calling AET	Yes	MEDDREAM

Proposed Called AET	Yes	administrator's choice
Maximum PDU size the AE can receive	No	32768
Maximum PDU size the AE can send	No	32768
Time-out waiting for A-ASSOCIATE RQ on open TCP/IP connection - ARTIM timeout	No	no timeout
Time-out waiting for acceptance or rejection Response to an Association Open Request - Application Level timeout	No	no timeout
Time-out waiting on an open association for the next message after sending A-RELEASE RSP or A-ABORT RQ - Closing timeout	No	no timeout
Time-out waiting on an open association for the next message - DIMSE timeout	No	no timeout
Support for the Basic TLS Secure Transport Connection Profile	No	unsupported
Accepted TLS ciphers	No	-
<b>Storage Server AE</b>		
Listening port	Yes	11116
Listening IP address	Yes	all available addresses
Accepted remote IP addresses	Yes	any
Accepted Called AETs	Yes	MEDDREAM
Accepted Calling AETs	Yes	non-empty list is required
List of DICOM AETs that identify the location from which composite object instances received by this Storage Server may be retrieved on the network	No	unsupported
Storage directory path prefix	Yes	administrator's choice
Pack command and data PDVs in one PDU	No	false
Time-out waiting for A-ASSOCIATE RQ on open TCP/IP connection - ARTIM timeout	No	no timeout
Time-out waiting for acceptance or rejection Response to an Association Open Request - Application Level timeout	No	no timeout
Time-out waiting on an open association for the next message after sending A-RELEASE RSP or A-ABORT RQ - closing timeout	No	no timeout
Time-out waiting on an open association for the next message - DIMSE timeout	No	no timeout
Maximum PDU size the AE can receive	Yes	32768
Maximum PDU size the AE can send	Yes	32768
Support for the Basic TLS Secure Transport Connection Profile	No	unsupported
Accepted TLS Ciphers	No	-

Note 1: applies only to searching for studies and sending a C-MOVE command. When Query/Retrieve Client is used for collecting attributes of a study, then the default timeout value is 5 seconds and configurable.

## 4 Processing and rendering

### 4.1 SOP Classes supported for display

Known unsupported non-image Classes, like Raw Data Storage (1.2.840.10008.5.1.4.1.1.66), are used by a hardcoded filter that removes those objects from the study. Export and Forward functionalities, however, will still transfer them.

At least one example of a DICOM object referenced in the table below is used in regular tests of MedDream.

Table 28. SOP Classes supported for display

SOP Class Name	SOP Class UID	Limitations
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	—
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	—
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	—
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	Except: Presentation State Shutter, Display Shutter, Bitmap Display Shutter, Overlay Plane
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Rendered as text only, no links to images
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	—
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	—
Digital Intra – oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	—
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	—
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	—
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	Rendered as text only, no links to images
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	—
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	—
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Except: Presentation State Shutter, Presentation State Mask, Mask, Display Shutter, Bitmap Display Shutter, Overlay Plane, Softcopy Presentation LUT, Softcopy VOI LUT
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	—
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.2	—
Legacy Converted Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.128.1	—
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Rendered as text only, no links to images
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	—
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	—
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	—
Ophthalmic Photography 8-Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	—
Ophthalmic Photography 16-Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	—

Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	—
Positron Emission Tomography Curve Storage (Retired)	1.2.840.10008.5.1.4.1.1.128	—
Radiation Therapy Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Displayed as a raw image
Radiation Therapy Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Displayed as a raw image
Radiation Therapy Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Custom use for Segmentation functionality
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	—
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	—
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	—
Ultrasound Multiframe Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	—
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	—
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	—
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	—
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	—
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	—
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	—
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Rendered as text only, no links to images
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	—

## 4.2 Transfer Syntaxes supported for display

When parsing the DICOM files for display purposes, MedDream expects DICOM Part 10 files — namely, with Preamble, Prefix and FileMetaInformation. If those pieces are missing, then only Implicit VR Little Endian transfer syntax is supported.

The Deflated Explicit VR Little Endian (1.2.840.10008.1.2.1.99) transfer syntax is not supported neither for visualization nor for network operations.

At least one example of a DICOM object referenced in the table below is used in regular tests of MedDream.

Table 29. Transfer Syntaxes supported for display

Transfer Syntax Name	Transfer Syntax UID
Explicit VR Big Endian	1.2.840.10008.1.2.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Implicit VR Little Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2
JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50
JPEG Extended (Process 2 & 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression (Process 4 only)	1.2.840.10008.1.2.4.51
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70
JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57
JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80
JPEG-LS Lossy (Near- Lossless) Image Compression	1.2.840.10008.1.2.4.81
MPEG2 Main Profile @ High Level	1.2.840.10008.1.2.4.101
MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100
MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103
MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102
RLE Lossless	1.2.840.10008.1.2.5

## **5 Media Interchange**

MedDream does not support Media Interchange.

## **6 Support of Extended Character Sets**

MedDream supports ISO\_IR 192 (Unicode UTF-8) as an extended character set.

## 7 Security

The DICOM capabilities of MedDream contain the following security features.

The Storage Server has the mandatory “acceptAETitles” parameter that lists acceptable Remote AE Titles; it is not possible to configure association acceptance from any title. There also are optional parameters “allowedIps” for remote IP address filtering, and “address” for binding to a single particular IP address available in the system instead of all addresses.

TLS and its mutual authentication is only supported for DICOMweb transactions (not for DIMSE), and must be configured globally via JVM command-line options `javax.net.ssl.trustStore` / `javax.net.ssl.keyStore`.

It is assumed that the Software is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- firewall or router protections to ensure that the Software only has network access to approved external hosts and services;
- appropriate secure network channels (e.g., such as a Virtual Private Network) for any communication with external hosts and services outside the locally secured environment.

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.