DICOM Conformance Statement

MedDream
Version 8.4.0

1 Table of Contents

2 Introduction

2.1 Revision History

Version	Date	Author	Changes
1.0	2024-04-15	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, or annotations based on Presentation State / Secondary Capture / RTSTRUCT, back to the Origin Server. This, however, is an optional scenario; configuration also allows the legacy scenario where those objects are still stored by the Storage Client AE 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 (or its part) 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
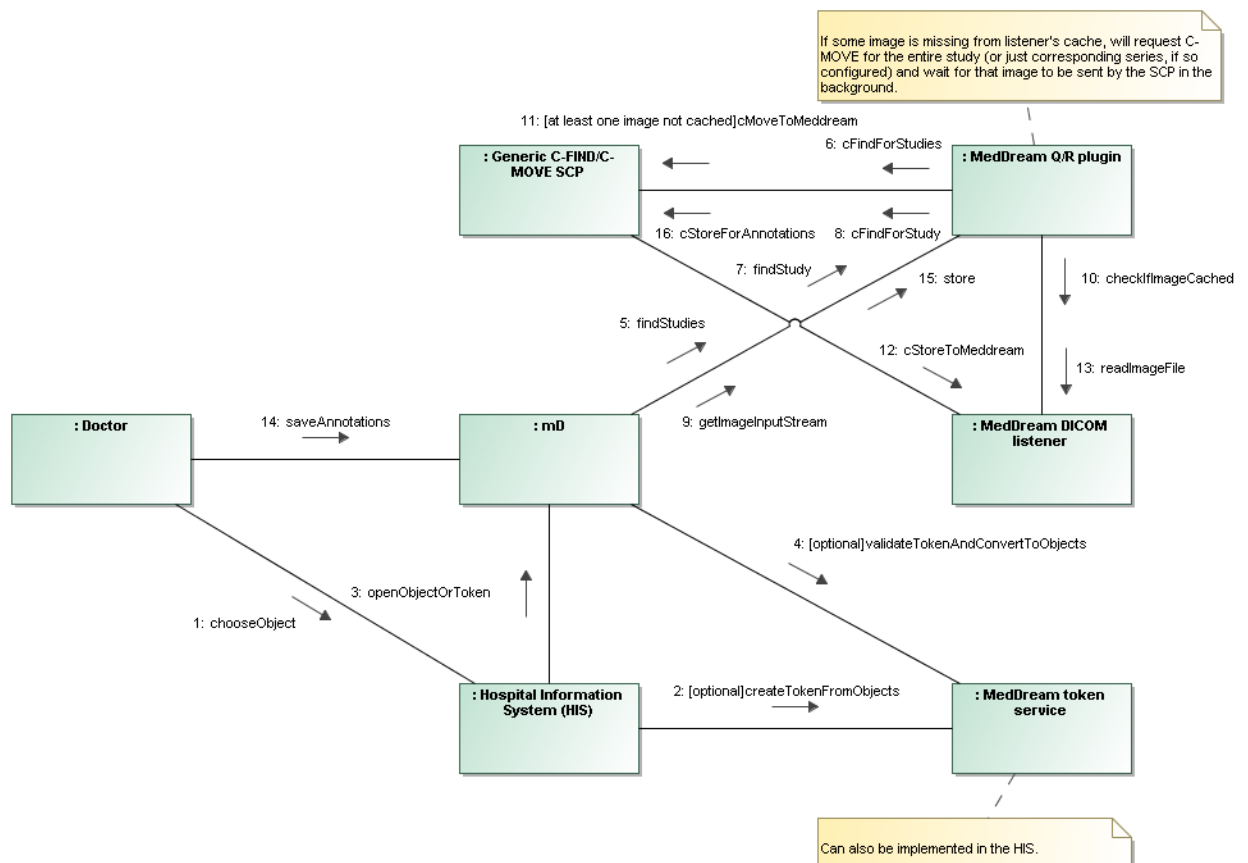
Figure 2. Universal mode: DICOM ("QR") - HIS integration

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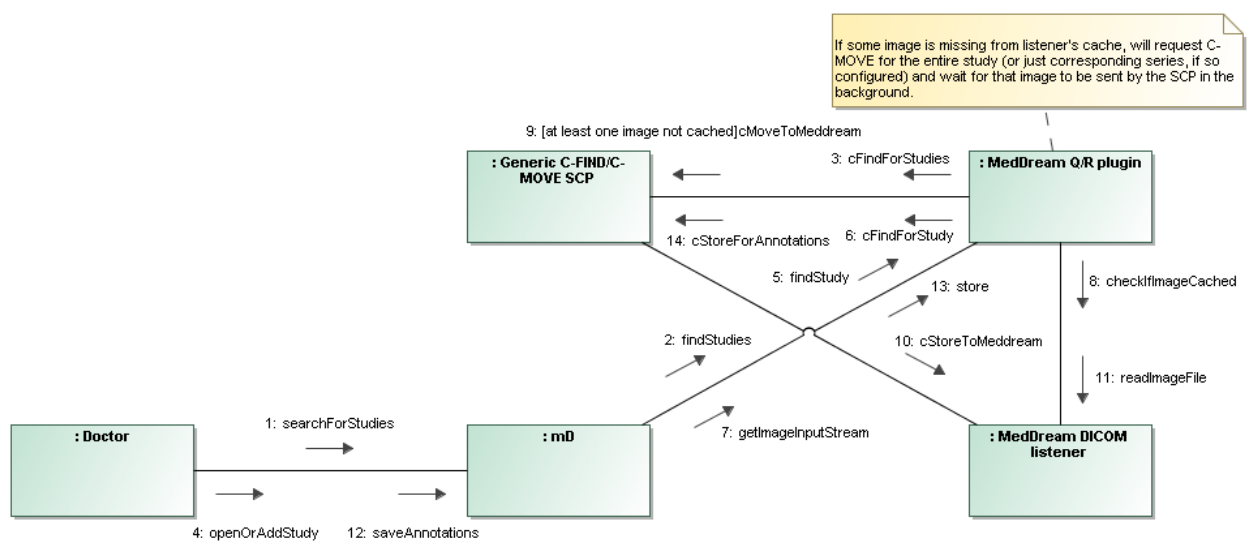
Figure 3. Universal mode: DICOM ("QR") - interactive use

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
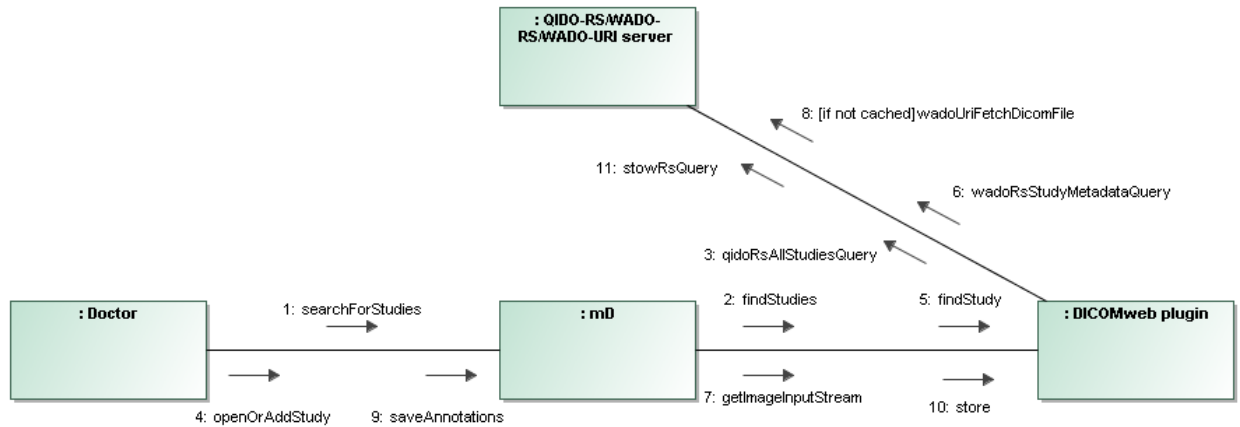
Figure 4. Universal mode: DICOMweb - interactive use

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	getImageInputStream		
8	wadoUriFetchDicomFile	[if not cached]	Can also use RetrieveInstance of WADO-RS.
9	saveAnnotations		
10	store		
11	stowRsQuery		

3.1.3.4 Universal mode: DICOMweb - HIS integration
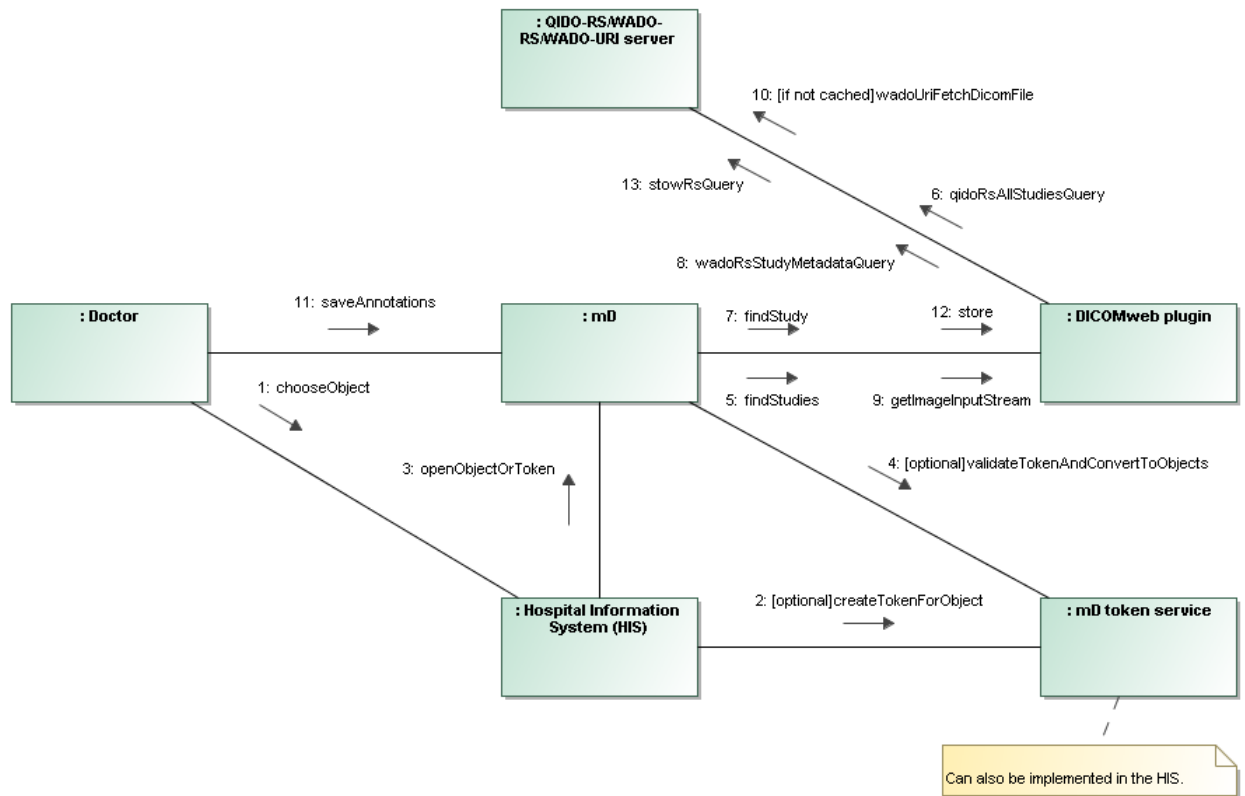
Figure 5. Universal mode: DICOMweb - HIS integration

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 RetrieveInstance of WADO-RS.
11	saveAnnotations		
12	store		
13	stowRsQuery		

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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

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.

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

3.2.1.1.3 Query Parameter Usage

Table 6. Query Parameters during Retrieve DICOM Instance Transaction

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

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 "*/*".

If the fileCustomHeader setting is not empty, then its value is added as is. The user must ensure the format "NAME: VALUE" and not attempt to override any permanently or dynamically present headers. Multiple values are to be separated by the pipe character ("|").

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

1) If the authType setting is "dcmsys", then the User Agent attempts a proprietary OAuth-based authentication. A POST request to loginUrl transfers a JSON-encoded object with fields "client_id" (from the clientId setting), "client_secret" (from the clientSecret setting), "grant_type" (hardcoded value "password"), "username" (from the username setting), "password" (from the password setting). The field "access_token" from the response is used in the Authorization: Bearer header in all subsequent requests to the Origin Server. When it expires according to the "expires_in" response field, the authentication request is repeated automatically.

2) If the authType setting is "google" (legacy condition: 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.

3) If the authType setting is "azure" (legacy condition: the azureAuthUrl setting is configured and 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.

4) If the authType setting is "custom" (legacy condition: 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.

5) If the authType setting is "basic" (legacy condition: only username and password settings are not empty), then they are encoded accordingly and added to the request as Authorization: Basic <encoded credentials>.

6) Otherwise (authType="none"), 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.

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.
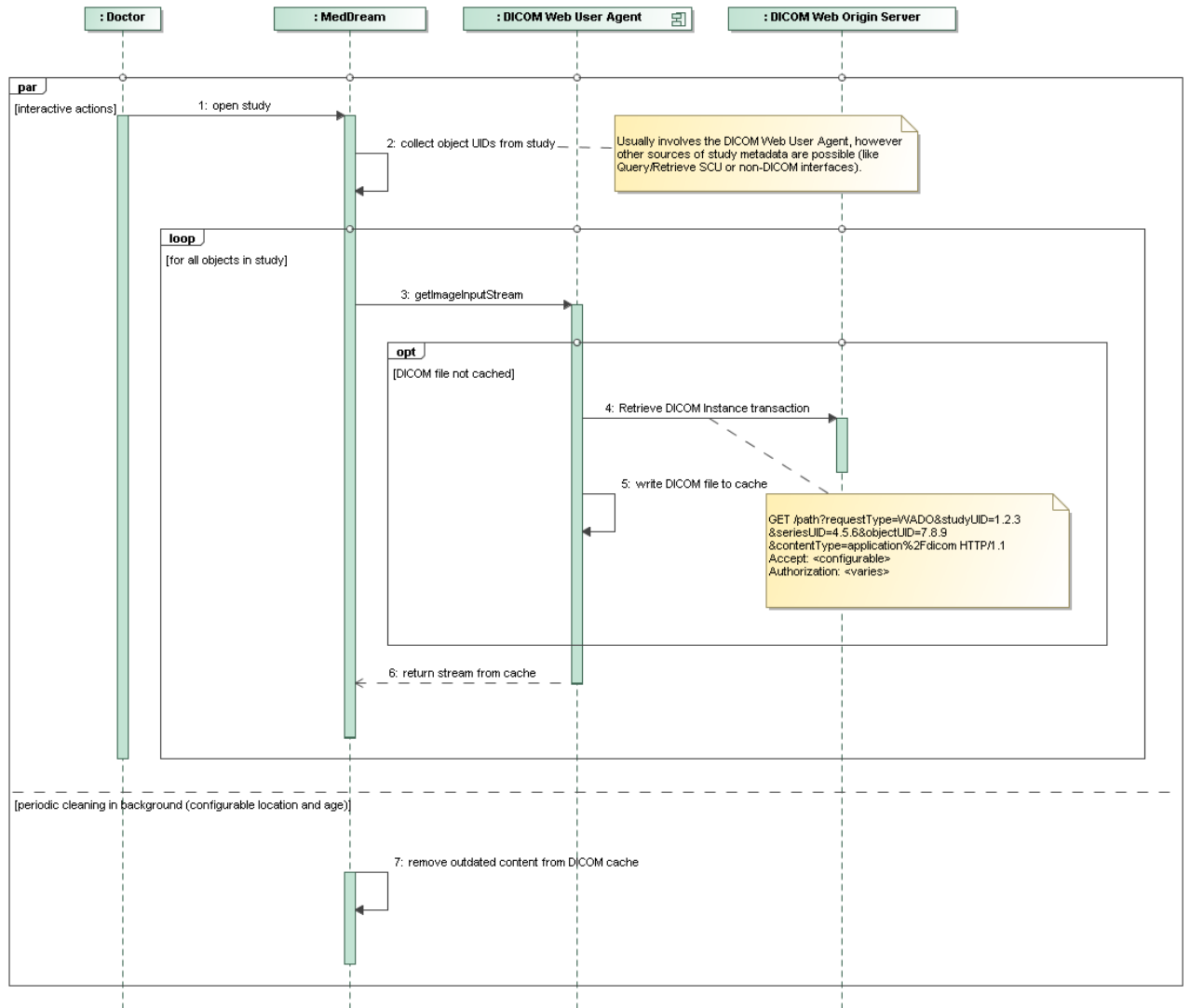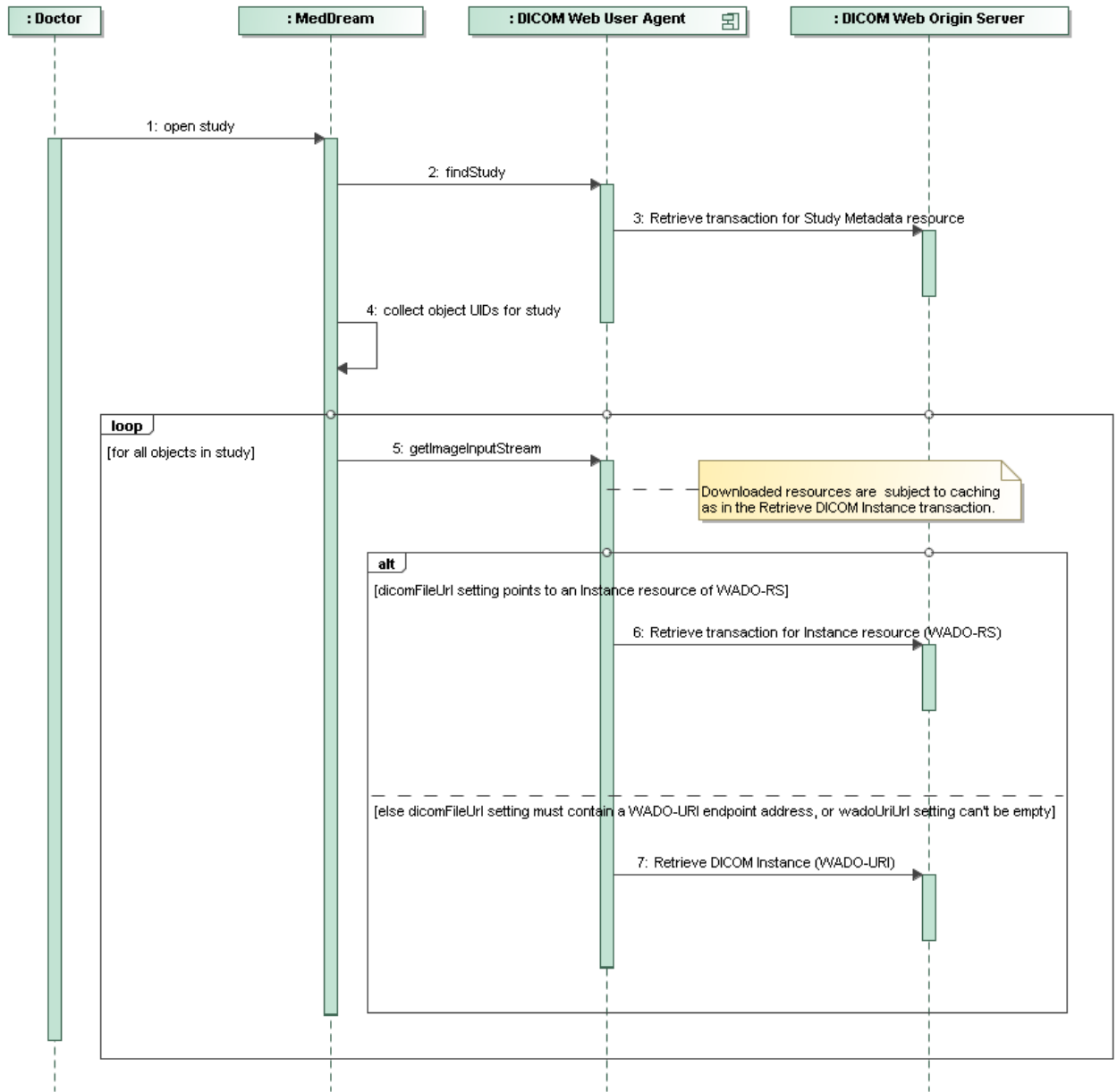

Figure 7. Places of the Retrieve transactions in the workflow

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.

When retrieving the Study Metadata resource, if the metaCustomHeader setting is not empty, then its value is added as is; same with Instance resource and fileCustomHeader setting. The user must ensure the format "NAME: VALUE" and not attempt to override any permanently or dynamically present headers. Multiple values are to be separated by the pipe character ("|").

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

1) If the authType setting is "dcmsys", then the User Agent attempts a proprietary OAuth-based authentication. A POST request to loginUrl transfers a JSON-encoded object with fields "client_id" (from the clientId setting), "client_secret" (from the clientSecret setting), "grant_type" (hardcoded value "password"), "username" (from the username setting), "password" (from the password setting). The field "access_token" from the response is used in the Authorization: Bearer header in all subsequent requests to the Origin Server. When it expires according to "expires_in" response field, the authentication request is repeated automatically.

2) If the authType setting is "google" (legacy condition: 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 Authorization: Bearer <token>.

3) If the authType setting is "azure" (legacy condition: 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.

4) If the authType setting is "custom" (legacy condition: 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.

5) If the authType setting is "basic" (legacy condition: only username and password settings are not empty), then they are encoded accordingly and added to the request as Authorization: Basic <encoded credentials>.

6) Otherwise (authType="none"), 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 columns.sourceAE.tag 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.
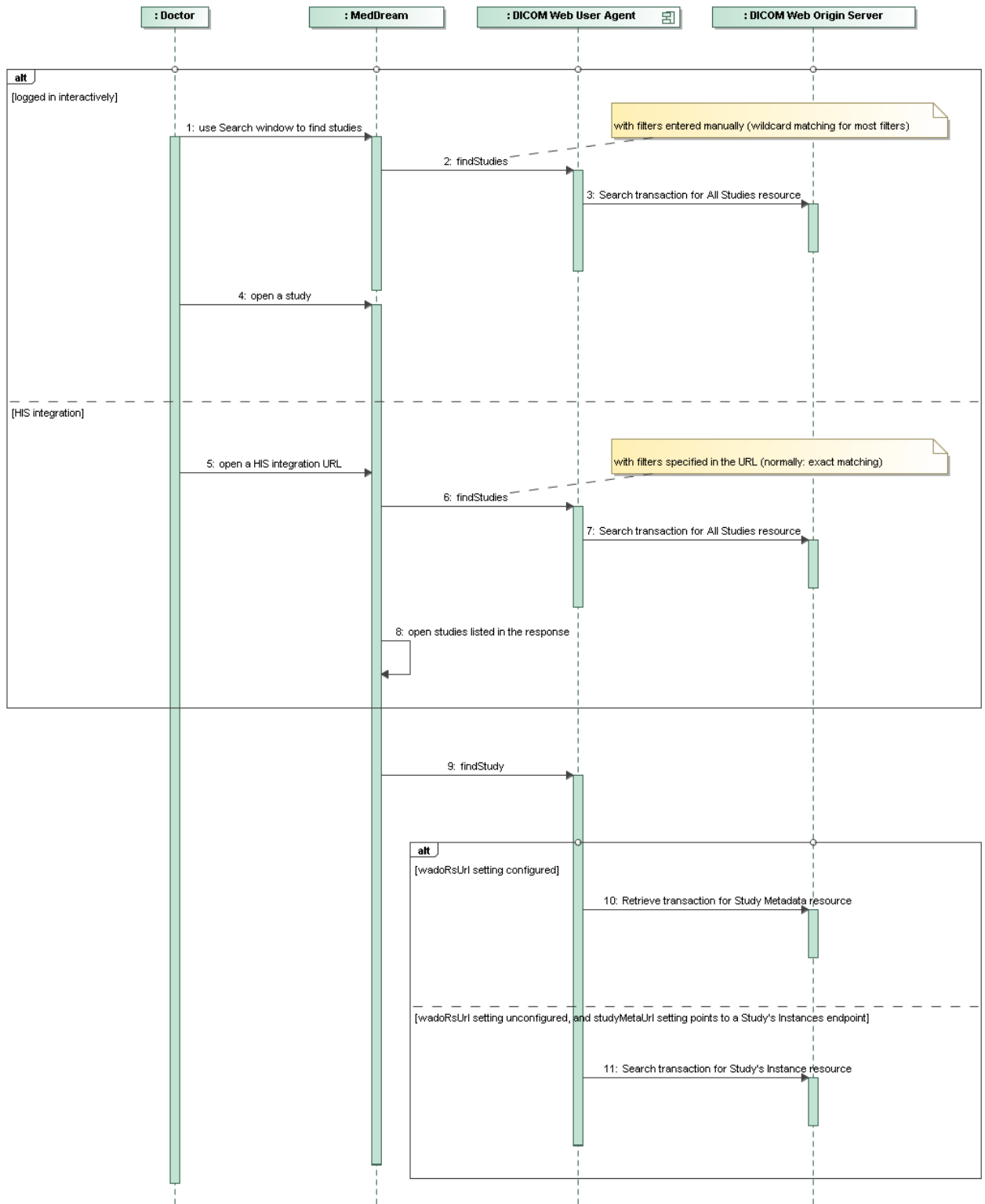
Figure 8. Places of the Search transactions in the workflow

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.

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 columns.sourceAE.tag and columns.receivedDate.tag 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 columns.sourceAE.tag)	When columns.sourceAE.tag 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 necessarily Study Metadata resource of WADO-RS; it can also be 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).

If the metaCustomHeader setting is not empty, then its value is added as is. The user must ensure the format "NAME: VALUE" and not attempt to override any permanently or dynamically present headers. Multiple values are to be separated by the pipe character ("|").

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

1) If the authType setting is "dcmsys", then the User Agent attempts a proprietary OAuth-based authentication. A POST request to loginUrl transfers a JSON-encoded object with fields "client_id" (from the clientId setting), "client_secret" (from the clientSecret setting), "grant_type" (hardcoded value "password"), "username" (from the username setting), "password" (from the password setting). The field "access_token" from the response is used in the Authorization: Bearer header in all subsequent requests to the Origin Server. When it expires according to "expires_in" field, the authentication request is repeated automatically.

2) If the authType setting is "google" (legacy condition: 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 Authorization: Bearer <token>.

3) If the authType setting is "azure" (legacy condition: the azureAuthUrl setting is configured and 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" (must be 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.

4) If the authType setting is "custom" (legacy condition: 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.

5) If the authType setting is "basic" (legacy condition: only username and password settings are not empty), then they are encoded accordingly and added to the request as Authorization: Basic <encoded credentials>.

6) Otherwise (authType="none"), 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 columns.sourceAE.tag setting (none by default)
• a tag configured via columns.receivedDate.tag setting (none by default)

Their absence might result in undefined behavior; a degree of importance of particular DICOM Attributes 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.
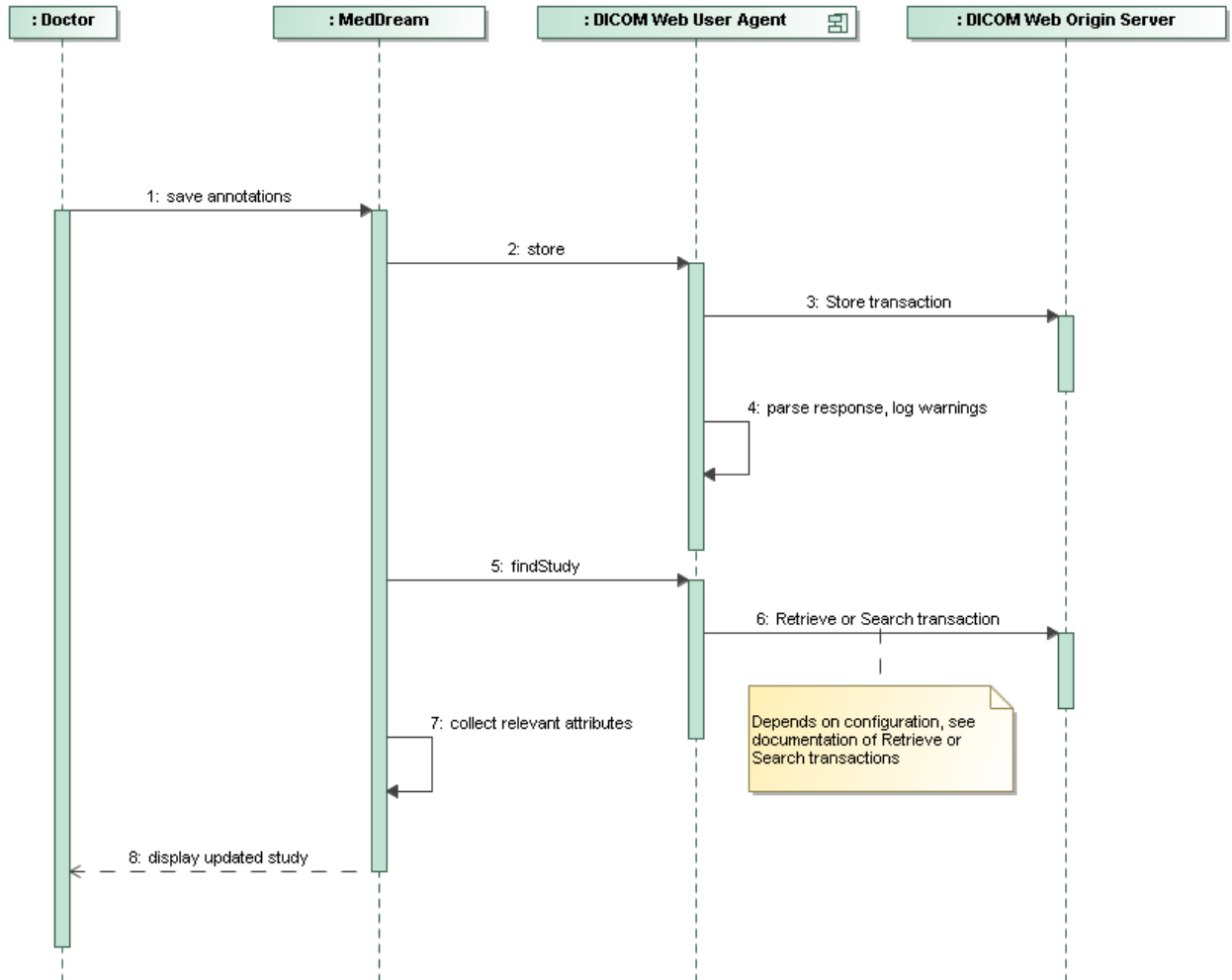
Figure 9. Places of the Store transactions in the workflow

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 uploadUrl must also contain the substring "/studies/{study}", 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 sendAcceptHeader setting.

If the sendCustomHeader setting is not empty, then its value is added as is. The user must ensure the format "NAME: VALUE" and do not attempt to override any permanently or dynamically present headers. Multiple values are to be separated by the pipe character ("|").

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

1) If the authType setting is "dcmsys", then the User Agent attempts a proprietary OAuth-based authentication. A POST request to loginUrl transfers a JSON-encoded object with fields "client_id" (from the clientId setting), "client_secret" (from the clientSecret setting), "grant_type" (hardcoded value "password"), "username" (from the username setting), "password" (from the password setting). The field "access_token" from the response is used in the Authorization: Bearer header in all subsequent requests to the Origin Server. When it expires according to "expires_in" field, the authentication request is repeated automatically.

2) If the authType setting is "google" (legacy condition: 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 Authorization: Bearer <token>.

3) If the authType setting is "azure" (legacy condition: the azureAuthUrl setting is configured and 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.

4) If the authType setting is "custom" (legacy condition: 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.

5) If the authType setting is "basic" (legacy condition: only username and password settings are not empty), then they are encoded accordingly and added to the request as Authorization: Basic <encoded credentials>.

6) Otherwise (authType="none"), 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, or a part of it missing in the on-disk cache, 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
There is no specific limit on number of parallel C-FIND associations. They are indirectly influenced by the limit on concurrent connections in the commercial license of MedDream. The results of a C-FIND request are displayed to the operator only after receiving them from SCP entirely.

The number of parallel C-MOVE associations can be partially controlled by the setting maxConnections (no limit by default). This limit is separately imposed on every configured storage, which is usually dedicated to a separate Remote AE.

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
When searching for studies interactively, or ordering a C-MOVE operation for study retrieval, 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	jdt280_6553

When fetching attributes of a study ("study structure"), a different network client is used:

Table 11. DICOM Implementation Class and Version for Query/Retrieve Client AE (study attributes scenario)

Implementation Class UID	1.2.40.0.13.1.1
Implementation Version Name	dcm4che-2.0

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 12. 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.
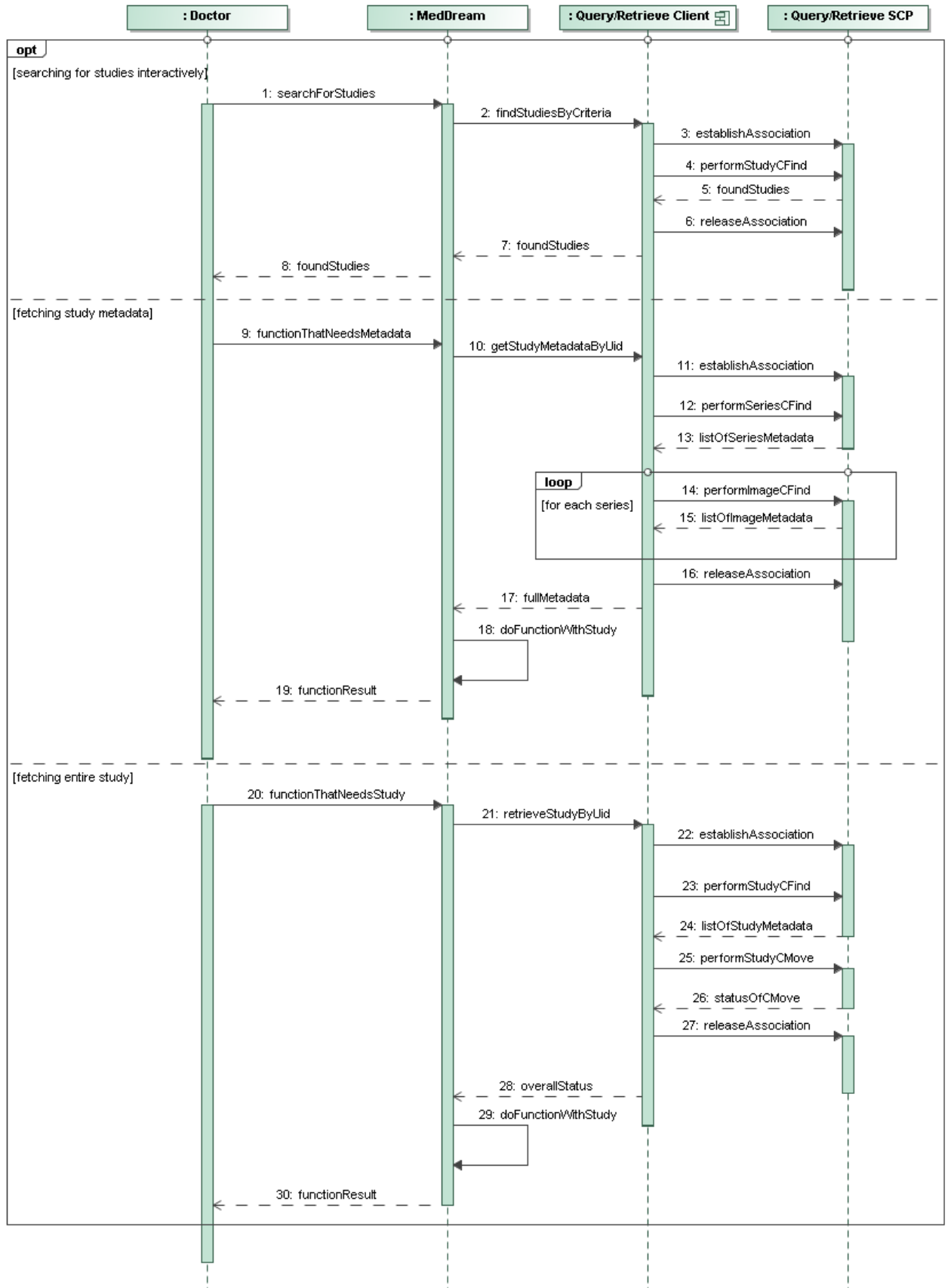
Figure 10. All interactions

3.2.2.3.1.2 Proposed Presentation Contexts

Table 13. 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 14. 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 15. 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 16. 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 Storage	1.2.840.10008.5.1.4.1.1.7.4	YES	NO
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 17. 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

The number of parallel associations is controlled by the setting com.softneta.meddream.dcmsnd.dicomSend-ThreadCount, and is 1 by default.

For every object sent, a separate Association is made.

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

When the annotations (PR, KO, SC, RTSTRUCT) are saved via the common QR-based mechanism, or a study is forwarded under configuration forwardingMethod=native, then the implementation information for this Application Entity is:

Table 18. DICOM Implementation Class and Version for Storage Client AE (configuration 1)

Implementation Class UID	1.3.6.1.4.1.44316.0.1.2
Implementation Version Name	MEDDREAM840

When the annotations are saved via the "QR" plugin (storage configuration includes storageApiEnabled=true), or a study is forwarded under configuration forwardingMethod=cmove, then the implementation information for this Application Entity is:

Implementation Class UID	1.2.826.0.1.3680043.2.60.0.1
Implementation Version Name	jdt280_6558

Forwarding of a study under configuration forwardingMethod=plugin uses a third-party Storage Client (not bundled with MedDream) which behavior will depend on its version installed at a particular infrastructure. See the conformance statement for the specific version of PacsOne Server.

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
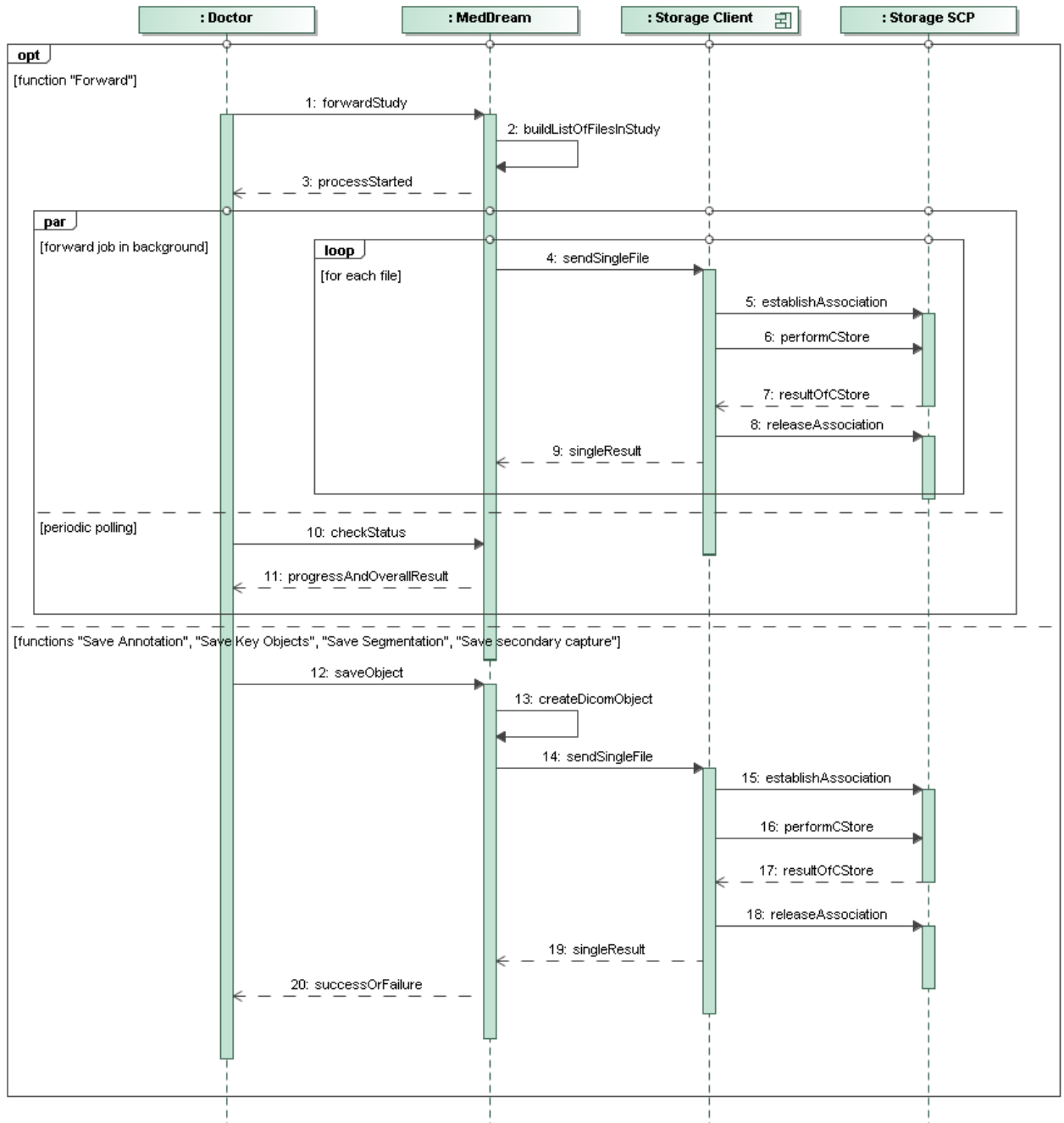
Figure 11. All interactions

3.2.3.3.1.2   Proposed Presentation Contexts

Table 20. 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	1.2.840.10008.1.2.4.57	SCU	None

		(Process 14)			
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
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	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	1.2.840.10008.1.2.4.70	SCU	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	RLE Lossless	1.2.840.10008.1.2.5	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	1.2.840.10008.1.2.1	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	1.2.840.10008.1.2	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	1.2.840.10008.1.2.4.70	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	1.2.840.10008.1.2	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	1.2.840.10008.1.2.4.70	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	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	1.2.840.10008.1.2	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	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)	1.2.840.10008.1.2.4.90	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	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	1.2.840.1000 8.1.2.4.70	SCU	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1 .4.1.1.1.1	RLE Lossless	1.2.840.1000 8.1.2.5	SCU	None
Encapsulated PDF Storage	1.2.840.10008.5.1 .4.1.1.104.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
Encapsulated PDF Storage	1.2.840.10008.5.1 .4.1.1.104.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2	SCU	None
Enhanced MR Image Storage	1.2.840.10008.5.1 .4.1.1.4.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	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	1.2.840.1000 8.1.2	SCU	None
Enhanced SR	1.2.840.10008.5.1 .4.1.1.88.22	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
Enhanced SR	1.2.840.10008.5.1 .4.1.1.88.22	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2	SCU	None
Enhanced US Volume Storage	1.2.840.10008.5.1 .4.1.1.6.2	JPEG Baseline (Process 1)	1.2.840.1000 8.1.2.4.50	SCU	None
General ECG Waveform Storage	1.2.840.10008.5.1 .4.1.1.9.1.2	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1 .4.1.1.11.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	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	1.2.840.1000 8.1.2	SCU	None
Key Object Selection Document	1.2.840.10008.5.1 .4.1.1.88.59	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5.1 .4.1.1.2.2	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
Legacy Converted Enhanced MR Image Storage	1.2.840.10008.5.1 .4.1.1.4.4	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
Legacy Converted Enhanced PET Image Storage	1.2.840.10008.5.1 .4.1.1.128.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
Mammography CAD SR	1.2.840.10008.5.1 .4.1.1.88.50	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
MR Image Storage	1.2.840.10008.5.1 .4.1.1.4	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
MR Image Storage	1.2.840.10008.5.1 .4.1.1.4	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2	SCU	None
MR Image Storage	1.2.840.10008.5.1 .4.1.1.4	JPEG 2000 Image Compression	1.2.840.1000 8.1.2.4.91	SCU	None
MR Image Storage	1.2.840.10008.5.1 .4.1.1.4	JPEG Lossless, Nonhierarchical (Process 14)	1.2.840.1000 8.1.2.4.57	SCU	None
MR Image Storage	1.2.840.10008.5.1 .4.1.1.4	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.1000 8.1.2.4.70	SCU	None
MR Image Storage	1.2.840.10008.5.1 .4.1.1.4	JPEG-LS Lossless Image Compression	1.2.840.1000 8.1.2.4.80	SCU	None
MR Image Storage	1.2.840.10008.5.1 .4.1.1.4	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.1000 8.1.2.4.81	SCU	None
MR Spectroscopy Storage	1.2.840.10008.5.1 .4.1.1.4.2	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
Multiframe True Color	1.2.840.10008.5.1	Explicit VR Little	1.2.840.1000	SCU	None

Secondary Capture Image Storage	.4.1.1.7.4	Endian	8.1.2.1		
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	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	1.2.840.10008.1.2.1	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)	1.2.840.10008.1.2.4.50	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	1.2.840.10008.1.2.1	SCU	None
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Private Philips 3D Presentation State Storage	1.3.46.670589.2.5.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Private Siemens CSA Non Image Storage	1.3.12.2.1107.5.9.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Radiation Therapy Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	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	1.2.840.10008.1.2	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	1.2.840.10008.1.2	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	1.2.840.10008.1.2	SCU	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG Baseline (Processes 2 & 4)	1.2.840.10008.1.2.4.51	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81	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	1.2.840.10008.1.2.4.103	SCU	None
Secondary Capture Image	1.2.840.10008.5.1	MPEG2 Main Profile	1.2.840.1000	SCU	None

Storage	.4.1.1.7	Main Level	8.1.2.4.100		
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	RLE Lossless	1.2.840.1000 8.1.2.5	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1 .4.1.1.6.1	Explicit VR Big Endian	1.2.840.1000 8.1.2.2	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1 .4.1.1.6.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1 .4.1.1.6.1	JPEG Baseline (Process 1)	1.2.840.1000 8.1.2.4.50	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1 .4.1.1.6.1	JPEG Baseline (Processes 2 & 4)	1.2.840.1000 8.1.2.4.51	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1 .4.1.1.6.1	RLE Lossless	1.2.840.1000 8.1.2.5	SCU	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1 .4.1.1.6	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	SCU	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1 .4.1.1.6	JPEG Lossless, Nonhierarchical (Process 14)	1.2.840.1000 8.1.2.4.57	SCU	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1 .4.1.1.6	JPEG Lossless, Nonhierarchical (Process 28)	1.2.840.1000 8.1.2.4.65	SCU	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1 .4.1.1.3.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	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	1.2.840.1000 8.1.2	SCU	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1 .4.1.1.3.1	JPEG 2000 Image Compression (Lossless Only)	1.2.840.1000 8.1.2.4.90	SCU	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1 .4.1.1.3.1	JPEG Baseline (Process 1)	1.2.840.1000 8.1.2.4.50	SCU	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1 .4.1.1.3.1	RLE Lossless	1.2.840.1000 8.1.2.5	SCU	None
Ultrasound Multiframe Image Storage (Retired)	1.2.840.10008.5.1 .4.1.1.3	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	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	1.2.840.1000 8.1.2.4.102	SCU	None
Video Endoscopic Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.1.1	MPEG2 Main Profile High Level	1.2.840.1000 8.1.2.4.101	SCU	None
Video Endoscopic Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.1.1	MPEG2 Main Profile Main Level	1.2.840.1000 8.1.2.4.100	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	1.2.840.1000 8.1.2.4.103	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	1.2.840.1000 8.1.2.4.102	SCU	None
Video Photographic Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.4.1	MPEG2 Main Profile High Level	1.2.840.1000 8.1.2.4.101	SCU	None
VL Endoscopic Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.1	MPEG2 Main Profile Main Level	1.2.840.1000 8.1.2.4.100	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	1.2.840.1000 8.1.2	SCU	None
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.6	JPEG Baseline (Process 1)	1.2.840.1000 8.1.2.4.50	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1 .4.1.1.12.1	Explicit VR Big Endian	1.2.840.1000 8.1.2.2	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1 .4.1.1.12.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1	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	1.2.840.1000 8.1.2	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1 .4.1.1.12.1	JPEG 2000 Image Compression	1.2.840.1000 8.1.2.4.91	SCU	None

X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCU	None
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	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	1.2.840.10008.1.2	SCU	None

3.2.3.3.1.3   SOP Specific Conformance for SOP Classes

Table 21. 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 22. 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 23. 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 24. DICOM application context name for Storage Server AE

Application Context Name	1.2.840.10008.3.1.1.1

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 25. DICOM Implementation Class and Version for Storage Server AE

Implementation Class UID	1.3.6.1.4.1.44316.0.1.2
Implementation Version Name	MEDDREAM840

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.
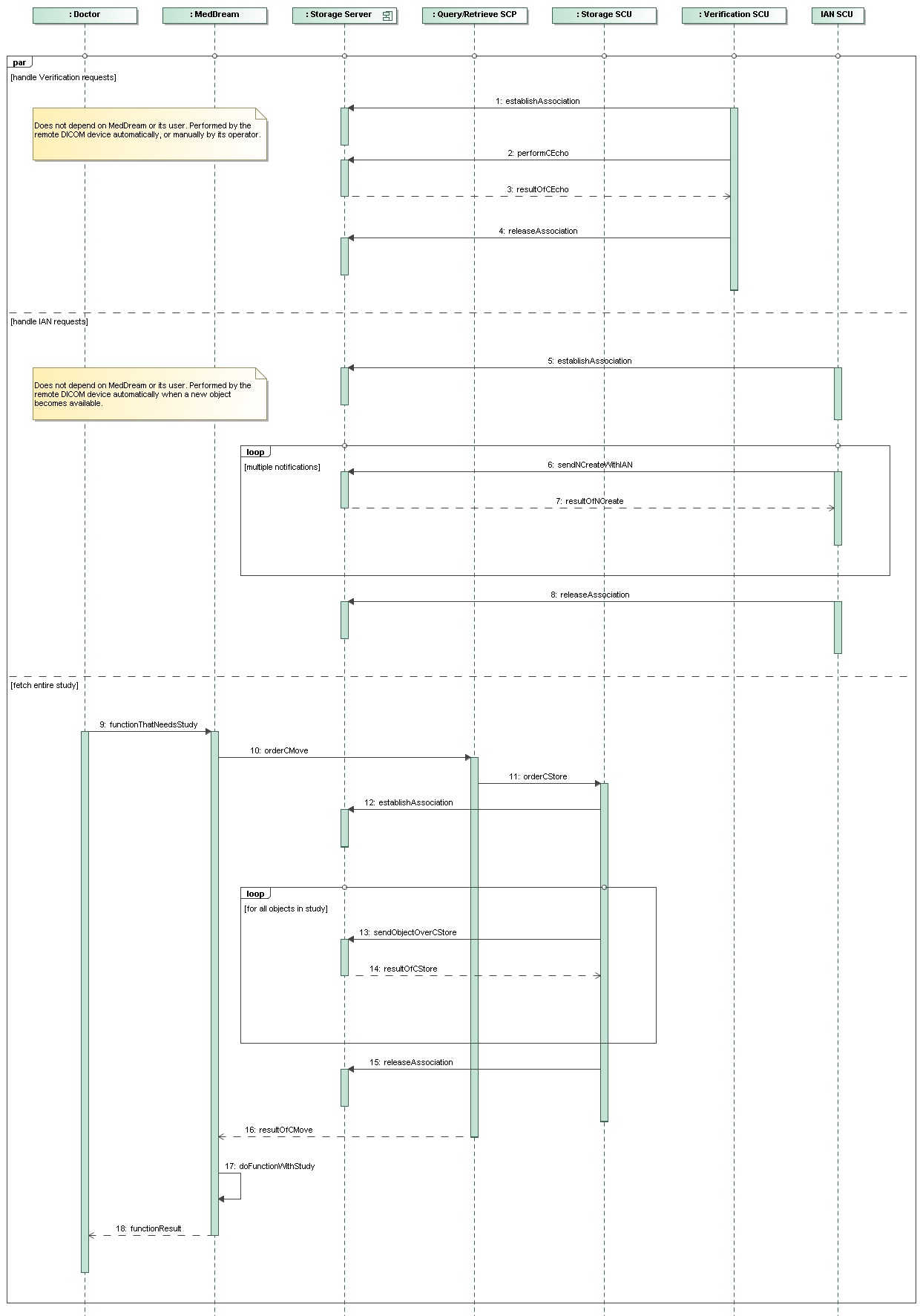
Figure 12. All interactions

3.2.4.3.1.2   Proposed Presentation Contexts

Table 26. Proposed Presentation Contexts for Storage Server AE

Abstract Syntax	Transfer Syntax	Role	Ext.

Name	UID	Name	UID		Neg.
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	1.2.840.10008.5.1.4.1.1.2	JPEG Lossless, Nonhierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.	JPEG Lossless,	1.2.840.100	SCP	None

	1.1.2	Nonhierarchical, First-Order Prediction	08.1.2.4.70		
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	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	RLE Lossless	1.2.840.10008.1.2.5	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	1.2.840.10008.1.2.2	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	1.2.840.10008.1.2.1	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	1.2.840.10008.1.2	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	1.2.840.10008.1.2.4.91	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)	1.2.840.10008.1.2.4.90	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)	1.2.840.10008.1.2.4.50	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	1.2.840.10008.1.2.4.70	SCP	None
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	RLE Lossless	1.2.840.10008.1.2.5	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	1.2.840.10008.1.2.1	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	1.2.840.10008.1.2	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	1.2.840.10008.1.2.4.70	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	1.2.840.10008.1.2	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	1.2.840.10008.1.2.4.70	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	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	1.2.840.10008.1.2	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	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)	1.2.840.10008.1.2.4.90	SCP	None
Digital X-Ray Image	1.2.840.10008.5.1.4.	JPEG Baseline	1.2.840.10008.1.100	SCP	None

Storage – for Presentation	1.1.1.1	(Process 1)	08.1.2.4.50		
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	RLE Lossless	1.2.840.10008.1.2.5	SCP	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	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	1.2.840.10008.1.2	SCP	None
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	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	1.2.840.10008.1.2	SCP	None
Instance Availability Notification SOP Class	1.2.840.10008.5.1.4.33	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Legacy Converted Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.4	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Legacy Converted Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.128.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	JPEG Lossless, Nonhierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.	JPEG-LS Lossy (Near-	1.2.840.10008.1.2.4.100	SCP	None

	1.1.4	Lossless) Image Compression	08.1.2.4.81		
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	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	1.2.840.10008.1.2.1	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)	1.2.840.10008.1.2.4.50	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	1.2.840.10008.1.2.1	SCP	None
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Private Philips 3D Presentation State Storage	1.3.46.670589.2.5.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Private Siemens CSA Non Image Storage	1.3.12.2.1107.5.9.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	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	1.2.840.10008.1.2	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	1.2.840.10008.1.2	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	1.2.840.10008.1.2	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	1.2.840.10008.1.2	SCP	None
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG Baseline (Processes 2 & 4)	1.2.840.10008.1.2.4.51	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80	SCP	None
Secondary Capture	1.2.840.10008.5.1.4.	JPEG-LS Lossy (Near-	1.2.840.10008.1.2.4.80	SCP	None

Image Storage	1.1.7	Lossless) Image Compression	08.1.2.4.81		
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	1.2.840.10008.1.2.4.103	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	MPEG2 Main Profile Main Level	1.2.840.10008.1.2.4.100	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	RLE Lossless	1.2.840.10008.1.2.5	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Big Endian	1.2.840.10008.1.2.2	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	JPEG Baseline (Processes 2 & 4)	1.2.840.10008.1.2.4.51	SCP	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	RLE Lossless	1.2.840.10008.1.2.5	SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	JPEG Lossless, Nonhierarchical (Process 14)	1.2.840.10008.1.2.4.57	SCP	None
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	JPEG Lossless, Nonhierarchical (Process 28)	1.2.840.10008.1.2.4.65	SCP	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian	1.2.840.10008.1.2.1	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	1.2.840.10008.1.2	SCP	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90	SCP	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50	SCP	None
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	RLE Lossless	1.2.840.10008.1.2.5	SCP	None
Ultrasound Multiframe Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCP	None
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2	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	1.2.840.10008.1.2.4.102	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	MPEG2 Main Profile High Level	1.2.840.10008.1.2.4.101	SCP	None
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	MPEG2 Main Profile Main Level	1.2.840.10008.1.2.4.100	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	1.2.840.10008.1.2.4.103	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	1.2.840.10008.1.2.4.102	SCP	None
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	MPEG2 Main Profile High Level	1.2.840.10008.1.2.4.101	SCP	None
VL Endoscopic Image	1.2.840.10008.5.1.4.	MPEG2 Main Profile	1.2.840.100	SCP	None

Storage	1.1.77.1.1	Main Level	08.1.2.4.10 0		
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 27. 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 28. 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 29. Configuration Parameter Table

Parameter	Configurable (Yes/No)	Default Value
DICOM Web User Agent AE		
searchPageSize: override the "limit" query parameter	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
fileAcceptHeader: value of Accept header during Retrieve transaction for Instance resource and during Retrieve DICOM Instance transaction	Yes	application/json
metaAcceptHeader: value of Accept header during Retrieve transaction for Study Metadata resource and during Search transaction	Yes	application/dicom
sendAcceptHeader: value of Accept header during Store transaction	Yes	application/json
metaCustomHeader: value of a custom header during Retrieve transaction for Instance resource and during Retrieve DICOM Instance transaction	Yes	no default value
fileCustomHeader: value of a custom header during Retrieve transaction for Study Metadata resource and during Search transaction	Yes	no default value
sendCustomHeader: value of a custom header during Store transaction	Yes	no default value
columns.sourceAE.tag: tag of DICOM Attribute supported by server as Source AE Title of the study	Yes	no default value
columns.receivedDate.tag: tag of DICOM Attribute supported by server as receive date of the study	Yes	no default value
Query/Retrieve Client AE		
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	-
blacklistedSopClasses: do not attempt C-MOVE on objects with SOP Classes listed here	Yes	-
maxConnections: limit of parallel C-MOVE sessions per every configured storage	Yes	unlimited
Storage Client AE		
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	-
Storage Server AE		
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 30. 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	16-bit only, no Waveform Annotation
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	16-bit only, no Waveform Annotation
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	Displayed as is (no special image processing)
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	Except: Dimension Indices
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	16-bit only, no Waveform Annotation
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. Only scalars (Width/Center) in 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	Temporal frame dimension only
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	—
Ophthalmic Photography 8-Bit Image	1.2.840.10008.5.1.4.1.1.77.1.5	—

Storage	.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 Image Storage	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	Only grid-based doses, only 16-bit, 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	Except: Frame Dimension Pointer
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	Except: Frame Dimension Pointer

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 31. 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

4.3 Other related notes

The setting com.softneta.dicom-parser.builtInOverlayEnabled disables overlay graphics in scenarios where images are traditionally rendered without user interaction, like display of image thumbnails or export of images into PNG format. During interactive image viewing, rendering of both legacy (single per image) and standard (up to 16 per image) overlay formats are controllable by the user.

For raster objects, unsupported values of Bits Allocated (0028,0100) are:
- larger than 16 when Samples per Pixel (0028,0002) is 1,
- larger than 8 when Samples Per Pixel is 3.

5   Media Interchange
5.1   Implementation Model

5.1.1   Implementation Data Flow
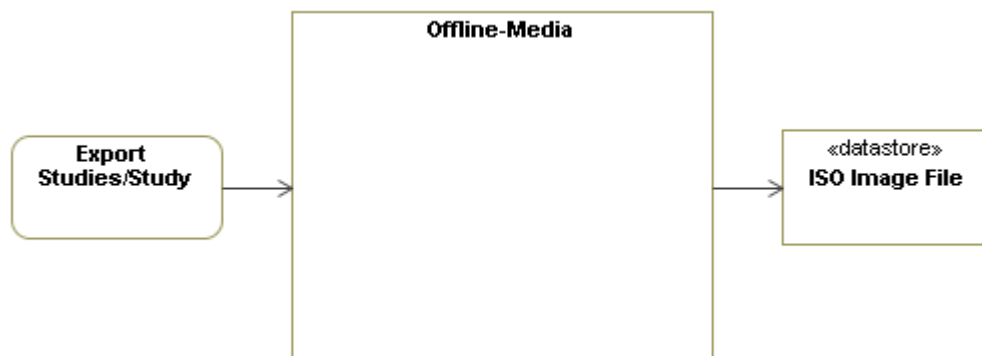
Figure 13. Data Flow Diagram

5.1.2   Functional Definition of AEs

5.1.2.1   Functional Definition of Offline-Media Application Entity

The Offline-Media Application Entity is activated upon user request on selected studies or on a particular opened study. It performs the following:

- copies DICOM Information Objects to a local storage device;
- creates a DICOMDIR file that represents the Information Objects to be recorded;
- records the Information Objects and the DICOMDIR file to an ISO 9660 image file.

5.1.3   Sequencing of Real-World Activities

5.1.3.1   Activity – Export DICOM studies

At least one study must be selected in search results, or opened for viewing. By pressing the "Export" button, the "Export" window is opened. Selecting the option group "Export DICOM studies and portable viewer" and choosing "ISO disk image" for "Media", then pressing the "Start" button, will pass the currently selected patient(s), study (or studies) and their images to Offline-Media AE.

A DICOM Data Set (SOP Instance) will be copied for each image from the PACS into a staging area; if a size limit has been chosen in the "Export" window, then a new dedicated staging area is created every time when the total size of copied files would exceed the limit. In each staging area, a DICOMDIR file is created that indexes all SOP Instances present there. Then an ISO 9660 disc image file is created for each staging area, including both DICOMDIR and SOP Instances, and presented as results of the operation in the "Export" window.

The end user is supposed to download every ISO file (volume) to the local machine, then use a third-party solution (software and hardware) to burn them to physical media and label related discs appropriately. On Windows it is possible to configure the shell to start the built-in burning tool as soon as the browser "opens" a downloaded file.

5.1.3.2   Implementation Class and Version

In most cases each SOP Instance is copied from the PACS via interfaces that retain its original File Meta header. Consequently, their implementation information is PACS-dependent.

However, files received by the Storage Server AE (integration over Query/Retrieve or the Query/Retrieve-based fallback scenario for DCM4CHEE PACS), and the DICOMDIR file created by MedDream when exporting studies in ISO format, have the following implementation information in its File Meta header:

Table 32. Implementation Class and Version for Offline-Media AE

Name	Value
Implementation Class UID	1.3.6.1.4.1.44316.0.1.2

Implementation Version Name	MEDDREAM840

5.2 Offline-Media AE Specification

5.2.1 Profiles, Activities and Roles

The Offline-Media AE provides standard conformance to Media Storage Service Class (PS 3.4), the File Format Class (PS 3.10) and the Media Storage Application Profile (PS 3.11). The profiles and roles are as follows:

Table 33. Offline-Media AE Specification

Application Profile	Real World Activity	Role
STD-GEN-CD	Export DICOM studies	FSC

5.2.1.1 File Meta Information for the Application Entity

The Offline-Media AE does not set the Source Application Entity Title.

5.2.2 Activity – Export DICOM studies

The Offline-Media AE acts as an FSC when requested to export SOP Instances from the PACS to an ISO disc image.

If the medium size limit has been chosen when starting the operation, then Offline-Media AE may create multiple volumes; in that case it attempts to fit as much files as possible into each volume.

The volume label is automatically generated in form "VOL1_ISO", "VOL2_ISO" … "VOLn_ISO".

When the AE is configured to add a portable viewer to each volume, this viewer can only display images present in a particular volume, as the corresponding DICOMDIR file only refers to SOP Instances on this volume. There is no provision to avoid splitting a series or a study across volumes, and to reference related volumes or even indicate the missing SOP Instances. Naïve copying of volume contents into a common directory tree will result in file/directory name collisions because grouping of SOP Instances by series, study and patient restarts anew in every volume. As a result, splitting into volumes is only practical when using limited-size media for offline transfer of SOP Instances to another PACS, which can individually import them back and therefore present each study as a whole.

5.2.3 SOP Classes

As a general rule, the Offline-Media AE supports at least the same set of SOP Classes and Transfer Syntaxes as the Storage Server AE (everything that can be received over the network is exportable). It also supports the Media Storage Directory for created DICOMDIR files.

Table 34. SOP Classes and Transfer Syntaxes for the STD-GEN-CD Profile

SOP Class	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2
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
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
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
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
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
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
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
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
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

CR Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
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
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
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
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
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
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
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
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian	1.2.840.10008.1.2.2
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
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
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
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
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
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
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
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
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
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	RLE Lossless	1.2.840.10008.1.2.5
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
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
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
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
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
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
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	1.2.840.10008.1.2.4.70
Digital Intra-oral X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.3	RLE Lossless	1.2.840.10008.1.2.5
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
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	1.2.840.10008.1.2
Digital Mammography X-Ray Image Storage – for	1.2.840.10008.5.1.4.1.1.1.2	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70

Presentation			
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	1.2.840.10008.1.2
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	1.2.840.10008.1.2.4.70
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
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	1.2.840.10008.1.2
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.10008.1.2.4.70
Digital X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.1	RLE Lossless	1.2.840.10008.1.2.5
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Explicit VR Little Endian	1.2.840.10008.1.2.1
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
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	1.2.840.10008.1.2
Instance Availability Notification SOP Class	1.2.840.10008.5.1.4.33	Explicit VR Little Endian	1.2.840.10008.1.2.1
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Explicit VR Little Endian	1.2.840.10008.1.2.1
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
Legacy Converted Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.4	Explicit VR Little Endian	1.2.840.10008.1.2.1
Legacy Converted Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.128.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Explicit VR Little Endian	1.2.840.10008.1.2.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
MR Image Storage	1.2.840.10008.5.1	JPEG Lossless, Nonhierarchical	1.2.840.1000

	.4.1.1.4	(Process 14)	8.1.2.4.57
MR Image Storage	1.2.840.10008.5.1 .4.1.1.4	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.1000 8.1.2.4.70
MR Image Storage	1.2.840.10008.5.1 .4.1.1.4	JPEG-LS Lossless Image Compression	1.2.840.1000 8.1.2.4.80
MR Image Storage	1.2.840.10008.5.1 .4.1.1.4	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.1000 8.1.2.4.81
MR Spectroscopy Storage	1.2.840.10008.5.1 .4.1.1.4.2	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7.4	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Multiframe True Color Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7.4	JPEG Baseline (Process 1)	1.2.840.1000 8.1.2.4.50
NM Image Storage	1.2.840.10008.5.1 .4.1.1.20	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
NM Image Storage	1.2.840.10008.5.1 .4.1.1.20	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.1000 8.1.2.4.70
Ophthalmic Photography 8-Bit Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.5.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Ophthalmic Photography 8-Bit Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.5.1	JPEG Baseline (Process 1)	1.2.840.1000 8.1.2.4.50
Ophthalmic Photography 16-Bit Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.5.2	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.5.4	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Private Philips 3D Presentation State Storage	1.3.46.670589.2.5 .1.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Private Siemens CSA Non Image Storage	1.3.12.2.1107.5.9. 1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Radiation Therapy Dose Storage	1.2.840.10008.5.1 .4.1.1.481.2	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2
Radiation Therapy Image Storage	1.2.840.10008.5.1 .4.1.1.481.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2
Radiation Therapy Plan Storage	1.2.840.10008.5.1 .4.1.1.481.5	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2
Radiation Therapy Structure Set Storage	1.2.840.10008.5.1 .4.1.1.481.3	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2
Raw Data Storage	1.2.840.10008.5.1 .4.1.1.66	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	Explicit VR Big Endian	1.2.840.1000 8.1.2.2
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	JPEG 2000 Image Compression	1.2.840.1000 8.1.2.4.91
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	JPEG 2000 Image Compression (Lossless Only)	1.2.840.1000 8.1.2.4.90
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	JPEG Baseline (Process 1)	1.2.840.1000 8.1.2.4.50
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	JPEG Baseline (Processes 2 & 4)	1.2.840.1000 8.1.2.4.51
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.1000 8.1.2.4.70
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	JPEG-LS Lossless Image Compression	1.2.840.1000 8.1.2.4.80
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.1000 8.1.2.4.81
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	1.2.840.1000 8.1.2.4.103
Secondary Capture Image	1.2.840.10008.5.1	MPEG2 Main Profile Main Level	1.2.840.1000

Storage	.4.1.1.7		8.1.2.4.100
Secondary Capture Image Storage	1.2.840.10008.5.1 .4.1.1.7	RLE Lossless	1.2.840.1000 8.1.2.5
Ultrasound Image Storage	1.2.840.10008.5.1 .4.1.1.6.1	Explicit VR Big Endian	1.2.840.1000 8.1.2.2
Ultrasound Image Storage	1.2.840.10008.5.1 .4.1.1.6.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Ultrasound Image Storage	1.2.840.10008.5.1 .4.1.1.6.1	JPEG Baseline (Process 1)	1.2.840.1000 8.1.2.4.50
Ultrasound Image Storage	1.2.840.10008.5.1 .4.1.1.6.1	JPEG Baseline (Processes 2 & 4)	1.2.840.1000 8.1.2.4.51
Ultrasound Image Storage	1.2.840.10008.5.1 .4.1.1.6.1	RLE Lossless	1.2.840.1000 8.1.2.5
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1 .4.1.1.6	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1 .4.1.1.6	JPEG Lossless, Nonhierarchical (Process 14)	1.2.840.1000 8.1.2.4.57
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1 .4.1.1.6	JPEG Lossless, Nonhierarchical (Process 28)	1.2.840.1000 8.1.2.4.65
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1 .4.1.1.3.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1 .4.1.1.3.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1 .4.1.1.3.1	JPEG 2000 Image Compression (Lossless Only)	1.2.840.1000 8.1.2.4.90
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1 .4.1.1.3.1	JPEG Baseline (Process 1)	1.2.840.1000 8.1.2.4.50
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1 .4.1.1.3.1	RLE Lossless	1.2.840.1000 8.1.2.5
Ultrasound Multiframe Image Storage (Retired)	1.2.840.10008.5.1 .4.1.1.3	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2
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	1.2.840.1000 8.1.2.4.102
Video Endoscopic Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.1.1	MPEG2 Main Profile High Level	1.2.840.1000 8.1.2.4.101
Video Endoscopic Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.1.1	MPEG2 Main Profile Main Level	1.2.840.1000 8.1.2.4.100
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	1.2.840.1000 8.1.2.4.103
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	1.2.840.1000 8.1.2.4.102
Video Photographic Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.4.1	MPEG2 Main Profile High Level	1.2.840.1000 8.1.2.4.101
VL Endoscopic Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.1	MPEG2 Main Profile Main Level	1.2.840.1000 8.1.2.4.100
VL Photographic Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.4	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1 .4.1.1.77.1.6	JPEG Baseline (Process 1)	1.2.840.1000 8.1.2.4.50
X-Ray Angiographic Image Storage	1.2.840.10008.5.1 .4.1.1.12.1	Explicit VR Big Endian	1.2.840.1000 8.1.2.2
X-Ray Angiographic Image Storage	1.2.840.10008.5.1 .4.1.1.12.1	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1 .4.1.1.12.1	Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2
X-Ray Angiographic Image Storage	1.2.840.10008.5.1 .4.1.1.12.1	JPEG 2000 Image Compression	1.2.840.1000 8.1.2.4.91
X-Ray Angiographic Image Storage	1.2.840.10008.5.1 .4.1.1.12.1	JPEG Lossless, Nonhierarchical, First-Order Prediction	1.2.840.1000 8.1.2.4.70
X-Ray Radiation Dose SR	1.2.840.10008.5.1 .4.1.1.88.67	Explicit VR Little Endian	1.2.840.1000 8.1.2.1
X-Ray Radiofluoroscopic	1.2.840.10008.5.1	Explicit VR Little Endian	1.2.840.1000

Image Storage	.4.1.1.12.2			8.1.2.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1 .4.1.1.12.2		Implicit VR Endian: Default Transfer Syntax for DICOM	1.2.840.1000 8.1.2

5.2.4 Augmented and Private Application Profiles

Offline-Media AE does not support any augmented or private Profiles.

5.2.5 Media Configuration

Not applicate to Offline-Media AE.

5.2.6 Basic Directory IOD

The table below lists structural attributes needed in the DICOMDIR file, and also attributes that are copied from the DICOM files being indexed.

Table 35. Basic Directory IOD – Module "Directory Information"

Attribute Name	Tag	VR	Type	Description
Offset of the First Directory Record of the Root Directory Entity	(0004,1200)	UL	1	Offset of the first byte (of the Item Data Element) of the first Directory Record of the Root Directory Entity. This Offset is a number of bytes starting with the first byte of the File Meta Information (includes the File Preamble and the DICM Prefix).
Offset of the Last Directory Record of the Root Directory Entity	(0004,1202)	UL	1	Offset of the first byte (of the Item Data Element) of the last Directory Record of the Root Directory Entity. This Offset is a number of bytes starting with the first byte of the File Meta Information (includes the File Preamble and the DICM Prefix).
File-set Consistency Flag	(0004,1212)	US	1	Always 0000H (no known inconsistencies)
Directory Record Sequence	(0004,1220)	SQ	2	Sequence of zero or more Items where each Item contains a Directory Record by including the Directory Elements from (0004,1400) to (0004,1511) and Record selection Keys as defined in subsequent tables
>Offset of the Next Directory Record	(0004,1400)	UL	1	Offset of the first byte (of the Item Data Element) of the next Directory Record of the same Directory Entity. This Offset is an unsigned integer representing a number of bytes starting with the first byte of the File Meta-information (includes the File Preamble and the DICM Prefix).
>Record In-use Flag	(0004,1410)	US	1	Always FFFFH (record is in use)
>Offset of Referen-ced Lower-Level Dir-ectory Entity	(0004,1420)	UL	1	Offset of the first byte (of the Item Data Element) of the first Directory Record of the Referenced Lower Level Directory Entity. This Offset is a number of bytes starting with the first byte of the File Meta Information (includes the File Preamble and the DICM Prefix). When no lower-level Directory Entity (containing at least one Directory Record) is referenced, this Attribute shall have a Value of 00000000H.
>Directory Record Type	(0004,1430)	CS	1	Defines a specialized type of Directory Record by reference to its position in the Media Storage Directory Information Model. Enumerated Values: "PATIENT", "STUDY", "SERIES", "IMAGE", "RT DOSE", "RT STRUCTURE SET", "RT PLAN", "PRESENTATION", "WAVEFORM", "SR DOCUMENT", "SPECTROSCOPY", "RAW DATA", "ENCAP DOC".
>Referenced File ID	(0004,1500)	CS	1C	A Multiple Value that represents the ordered components of the File ID containing a "referenced object" or Referenced SOP Instance. Present if the Directory Record references a SOP Instance -- that is, record type is not "PATIENT", "STUDY" and

Attribute Name	Tag	VR	Type	Description
				"IMAGE". The Viewer uses up to 4 components, with up to 8 characters in each. The first component is always "PAT" + ordinal number; in a similar fashion deeper levels use pref–ixes "STU", "SER" and "IMA" (the latter is the same for any SOP Class).
>Referenced SOP Class UID in File	(0004,1510)	UI	1C	Unique ID for the SOP Class of the Instance stored in the referenced File. Required if the Directory Record references a SOP Instance.
>Referenced SOP Instance UID in File	(0004,1511)	UI	1C	Unique Identifier for the SOP Instance stored in the referenced file. Present if the Directory Record references a SOP Instance.
>Referenced Transfer Syntax UID in File	(0004,1512)	UI	1C	Unique Identifier for the Transfer Syntax used to encode the Instance stored in the referenced file. Required if the Directory Record references a SOP Instance.
>Include Record Selection Keys (see subsequent tables)				

NOTE: in the subsequent tables the attribute is merely copied from the indexed file if available. There is no provision

- to convert a missing attribute to an empty one for Type 2, or
- to fail the export (or at least warn the operator) if a Type 1 attribute is missing, or
- to verify the actual condition behind Type 1C.

Table 36. Basic Directory IOD – Keys of "PATIENT" Directory Record

Attribute Name	Tag	VR	Type	Description
Specific Character Set	(0008,0005)	CS	1C	Character Set that expands or replaces the Basic Graphic Set
Patient's Name	(0010,0010)	PN	2	Patient's full name
Patient ID	(0010,0020)	LO	1	Primary identifier for the Patient

Table 37. Basic Directory IOD – Keys of "STUDY" Directory Record

Attribute Name	Tag	VR	Type	Description
Specific Character Set	(0008,0005)	CS	1C	Character Set that expands or replaces the Basic Graphic Set
Study Date	(0008,0020)	DA	1	Date the Study started
Study Time	(0008,0030)	TM	1	Time the Study started
Accession Number	(0008,0050)	SH	2	A departmental Information System generated number that identifies the Imaging Service Request
Study Description	(0008,1030)	LO	2	Institution-generated description or classification of the Study (component) performed
Study Instance UID	(0020,000D)	UI	1C	Unique identifier for the Study. Always present.
Study ID	(0020,0010)	SH	1	User or equipment generated Study identifier

Table 38. Basic Directory IOD – Keys of "SERIES" Directory Record

Attribute Name	Tag	VR	Type	Description
Modality	(0008,0060)	CS	1	Type of device, process or method that originally acquired or produced the data used to create the Instances in this Series
Series Instance UID	(0020,000E)	UI	1	Unique identifier of the Series

Series Number	(0020,0011)	IS	1	A number that identifies the Series

Table 39. Basic Directory IOD – Keys of "IMAGE" Directory Record

Attribute Name	Tag	VR	Type	Description
Instance Number	(0020,0013)	IS	1	A number that identifies the image

Table 40. Basic Directory IOD – Keys of "RT DOSE" Directory Record

Attribute Name	Tag	VR	Type	Description
Instance Number	(0020,0013)	IS	1	A number that identifies the object
Dose Summation Type	(3004,000A)	CS	1	Type of dose summation

Table 41. Basic Directory IOD – Keys of "RT STRUCTURE SET" Directory Record

Attribute Name	Tag	VR	Type	Description
Specific Character Set	(0008,0005)	CS	1C	Character Set that expands or replaces the Basic Graphic Set
Instance Number	(0020,0013)	IS	1	A number that identifies the object
Structure Set Label	(3006,0002)	SH	1	User-defined label for Structure Set
Structure Set Date	(3006,0008)	DA	2	Date at which Structure Set was last modified
Structure Set Time	(3006,0009)	TM	2	Time at which Structure Set was last modified

Table 42. Basic Directory IOD – Keys of "RT PLAN" Directory Record

Attribute Name	Tag	VR	Type	Description
Specific Character Set	(0008,0005)	CS	1C	Character Set that expands or replaces the Basic Graphic Set
Instance Number	(0020,0013)	IS	1	A number that identifies the object
RT Plan Label	(300A,0002)	SH	1	User-defined label for treatment plan
RT Plan Date	(300A,0006)	DA	2	Date treatment plan was last modified
RT Plan Time	(300A,0007)	TM	2	Time treatment plan was last modified

Table 43. Basic Directory IOD – Keys of "PRESENTATION" Directory Record

Attribute Name	Tag	VR	Type	Description
Specific Character Set	(0008,0005)	CS	1C	Character Set that expands or replaces the Basic Graphic Set
Referenced Series Sequence	(0008,1115)	SQ	1C	Sequence of Items where each Item includes the Attributes of one Series to which the Presentation applies
Instance Number	(0020,0013)	IS	1	A number that identifies the object
Content Label	(0070,0080)	CS	1	A label that is used to identify the indexed presentation
Content Description	(0070,0081)	LO	2	A description of the content of the indexed presentation
Presentation Creation Date	(0070,0082)	DA	1	Date on which the indexed presentation was created
Presentation Creation Time	(0070,0083)	TM	1	Time at which the indexed presentation was created
Content Creator's Name	(0070,0084)	PN	3	Name of operator (such as a technologist or physician) creating the content of the presentation

Table 44. Basic Directory IOD – Keys of "WAVEFORM" Directory Record

Attribute Name	Tag	VR	Type	Description
Content Date	(0008,0023)	DA	1	The date the content creation started
Content Time	(0008,0033)	TM	1	The time the content creation started
Instance Number	(0020,0013)	IS	1	A number that identifies the object

Table 45. Basic Directory IOD – Keys of "SR DOCUMENT" Directory Record

Attribute Name	Tag	VR	Type	Description
Specific Character	(0008,0005)	CS	1C	Character Set that expands or replaces the Basic Graphic

				Set
Content Date	(0008,0023)	DA	1	The date the content creation started
Content Time	(0008,0033)	TM	1	The time the content creation started
Instance Number	(0020,0013)	IS	1	A number that identifies the object
Verification DateTime	(0040,A030)	DT	1C	Most recent Date and Time of verification among those defined in the Verifying Observer Sequence (0040,A073)
Concept Name Code Sequence	(0040,A043)	SQ	1	Code describing the concept represented by the root Content Item (Document Title)
Content Sequence	(0040,A730)	SQ	1C	Contains the Target Content Items that modify the Concept Name Code Sequence of the root Content Item (Document Title). All, and only, Content Items with the HAS CONCEPT MOD relationship from the root Content Item shall be included in this Sequence.
Completion Flag	(0040,A491)	CS	1	The estimated degree of completeness of this SR Document
Verification Flag	(0040,A493)	CS	1	Indicates whether this SR Document is Verified

Table 46. Basic Directory IOD – Keys of "SPECTROSCOPY" Directory Record

Attribute Name	Tag	VR	Type	Description
Image Type	(0008,0008)	CS	1	Image identification characteristics
Content Date	(0008,0023)	DA	1	The date the content creation started
Content Time	(0008,0033)	TM	1	The time the content creation started
Referenced Image Evidence Sequence	(0008,9092)	SQ	1C	Full set of Composite SOP Instances referred to inside the Referenced Image Sequences of this Enhanced MR Image SOP Instance
Instance Number	(0020,0013)	IS	1	A number that identifies the object
Number of Frames	(0028,0008)	US	1	Number of frames in a Multi-frame Image
Rows	(0028,0010)	US	1	Number of rows in the image
Columns	(0028,0011)	US	1	Number of columns in the image
Data Point Rows	(0028,9001)	UL	1	Number of rows of data points in spectroscopic data
Data Point Columns	(0028,9002)	UL	1	Number of columns of data points in spectroscopic data

Table 47. Basic Directory IOD – Keys of "RAW DATA" Directory Record

Attribute Name	Tag	VR	Type	Description
Content Date	(0008,0023)	DA	1	The date the content creation started
Content Time	(0008,0033)	TM	1	The time the content creation started
Instance Number	(0020,0013)	IS	1	A number that identifies the object

Table 48. Basic Directory IOD – Keys of "ENCAP DOC" Directory Record

Attribute Name	Tag	VR	Type	Description
Specific Character Set	(0008,0005)	CS	1C	Character Set that expands or replaces the Basic Graphic Set
Content Date	(0008,0023)	DA	2	The date the content creation started
Content Time	(0008,0033)	TM	2	The time the content creation started
Instance Number	(0020,0013)	IS	1	A number that identifies the object
Concept Name Code Sequence	(0040,A043)	SQ	2	Code describing the concept represented by the root Content Item (Document Title)
Document Title	(0042,0010)	ST	2	The title of the document
MIME Type of En-capsulated Docu-ment	(0042,0012)	LO	1	The type of the encapsulated document stream described using the MIME Media Type

Table 49. Basic Directory IOD – Mapping of SOP Class UID to Record Type

SOP Class UID of the indexed object	Assigned (0004,1430) Directory Record Type
1.2.840.10008.5.1.4.1.1.1	IMAGE

1.2.840.10008.5.1.4.1.1.1.1	
1.2.840.10008.5.1.4.1.1.1.2	
1.2.840.10008.5.1.4.1.1.1.2.1	
1.2.840.10008.5.1.4.1.1.1.3	
1.2.840.10008.5.1.4.1.1.2	
1.2.840.10008.5.1.4.1.1.2.2	
1.2.840.10008.5.1.4.1.1.3	
1.2.840.10008.5.1.4.1.1.3.1	
1.2.840.10008.5.1.4.1.1.4	
1.2.840.10008.5.1.4.1.1.4.1	
1.2.840.10008.5.1.4.1.1.4.4	
1.2.840.10008.5.1.4.1.1.6	
1.2.840.10008.5.1.4.1.1.6.1	
1.2.840.10008.5.1.4.1.1.6.2	
1.2.840.10008.5.1.4.1.1.7.1	
1.2.840.10008.5.1.4.1.1.7.4	
1.2.840.10008.5.1.4.1.1.12.1	
1.2.840.10008.5.1.4.1.1.12.2	
1.2.840.10008.5.1.4.1.1.13.1.3	
1.2.840.10008.5.1.4.1.1.20	
1.2.840.10008.5.1.4.1.1.77.1.1	
1.2.840.10008.5.1.4.1.1.77.1.1.1	
1.2.840.10008.5.1.4.1.1.77.1.4	
1.2.840.10008.5.1.4.1.1.77.1.4.1	
1.2.840.10008.5.1.4.1.1.77.1.5.1	
1.2.840.10008.5.1.4.1.1.77.1.5.2	
1.2.840.10008.5.1.4.1.1.77.1.5.4	
1.2.840.10008.5.1.4.1.1.77.1.6	
1.2.840.10008.5.1.4.1.1.128	
1.2.840.10008.5.1.4.1.1.128.1	
1.2.840.10008.5.1.4.1.1.481.1	
1.2.840.10008.5.1.4.1.1.481.2	RT DOSE
1.2.840.10008.5.1.4.1.1.481.3	RT STRUCTURE SET
1.2.840.10008.5.1.4.1.1.481.5	RT PLAN
1.2.840.10008.5.1.4.1.1.11.1	PRESENTATION
1.2.840.10008.5.1.4.1.1.11.2	
1.2.840.10008.5.1.4.1.1.9.1.1	WAVEFORM
1.2.840.10008.5.1.4.1.1.9.1.2	
1.2.840.10008.5.1.4.1.1.9.1.3	
1.2.840.10008.5.1.4.1.1.88.11	SR DOCUMENT
1.2.840.10008.5.1.4.1.1.88.22	
1.2.840.10008.5.1.4.1.1.88.33	
1.2.840.10008.5.1.4.1.1.88.50	
1.2.840.10008.5.1.4.1.1.88.59	
1.2.840.10008.5.1.4.1.1.88.65	
1.2.840.10008.5.1.4.1.1.88.67	
1.2.840.10008.5.1.4.1.1.4.2	SPECTROSCOPY
1.2.840.10008.5.1.4.1.1.66	RAW DATA
1.2.840.10008.5.1.4.1.1.104.1	ENCAP DOC

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.

8 Annexes

8.1 IOD Contents

8.1.1 Created SOP Instances

Abbreviations used for presence of values (PoV):

VNAP

Value Not Always Present (attribute has zero length if no value is present) – Applicable for Type 2 or 2C.

ANAP

Attribute is not always present – Applicable for Type 3.

ALWAYS

Attribute is always present with a value – Applicable for Type 1 or 1C.

EMPTY

Attribute is sent without a value – Applicable for Type 2.

Abbreviations used for sources of data:

USER

Attribute value is generated from user input.

COPY

Attribute value is copied from the image being annotated. Some attributes can be copied from another annotation in the same series.

AUTO

Attribute value is generated automatically or is a constant.

CONFIG

Attribute value is a configurable parameter.

Attributes not critical for correct operation of the Viewer are not validated. At least custom enumerated values from a standards-noncompliant original might propagate further. However, the Viewer ensures ANAP by converting a missing attribute to an empty one during copy.

8.1.1.1 Secondary Capture Image IOD

Table 50. Use of Modules

IE	Module	Usage
Patient	Patient	MANDATORY
Study	General Study	MANDATORY
	Patient Study	OPTIONAL
Series	General Series	MANDATORY
Equipment	General Equipment	OPTIONAL
	SC Equipment	MANDATORY
Image	General Image	MANDATORY
	General Reference	MANDATORY
	Image Pixel	MANDATORY
	SOP Common	MANDATORY

The General Reference module is not MANDATORY in the standard but is always present in SC instances produced by Viewer.

Table 51. Secondary Capture Image IOD – Module "Patient"

Tag	Type	VR	Name	Description	PoV	Source
(0010,0010)	2	PN	Patient's Name	Patient's full name	VNAP	COPY
(0010,0020)	2	LO	Patient ID	Primary identifier for the Patient. The setting "com.softneta.meddream. newObjectsUseMetadataFromPacs" controls whether the value is copied from file or from PACS-indexed metadata.	VNAP	COPY
(0010,0021)	3	LO	Issuer of Patient ID	Identifier of the Assigning Authority (system, organization, agency, or	ANAP	COPY

Tag	Type	VR	Name	Description	PoV	Source
				department) that issued the Patient ID.		
(0010,0030)	2	DA	Patient's Birth Date	Birth date of the Patient	VNAP	COPY
(0010,0032)	3	TM	Patient's Birth Time	Birth time of the Patient	ANAP	COPY
(0010,0040)	2	CS	Patient's Sex	Sex of the Patient	VNAP	COPY
(0010,1000)	3	LO	Other Patient IDs (RETIRED)	Other identification numbers or codes used to identify the patient	ANAP	COPY
(0010,1001)	3	PN	Other Patient Names	Other names used to identify the Patient	ANAP	COPY
(0010,2160)	3	SH	Ethnic Group	Ethnic group or race of the Patient	ANAP	COPY
(0010,4000)	3	LT	Patient Comments	User-defined additional information about the Patient	ANAP	COPY

Table 52. Secondary Capture Image IOD – Module "General Study"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0020)	2	DA	Study Date	Date the Study started	VNAP	COPY
(0008,0030)	2	TM	Study Time	Time the Study started	VNAP	COPY
(0008,0050)	2	SH	Accession Number	A departmental Information System generated number that identifies the Imaging Service Request	VNAP	COPY
(0008,0090)	2	PN	Referring Physician's Name	Name of the Patient's referring physician	VNAP	COPY
(0008,1030)	2	LO	Study Description	Institution-generated description or classification of the Study (component) performed	VNAP	COPY
(0020,000D)	1	UI	Study Instance UID	Unique identifier for the Study	ALWAYS	COPY
(0020,0010)	2	SH	Study ID	User or equipment generated Study identifier	VNAP	COPY

Table 53. Secondary Capture Image IOD – Module "Patient Study"

Tag	Type	VR	Name	Description	PoV	Source
(0008,1080)	3	LO	Admitting Diagnoses Description	Description of the admitting diagnosis (diagnoses).	ANAP	COPY
(0010,1010)	3	AS	Patient's Age	Age of the Patient	ANAP	COPY
(0010,1020)	3	DS	Patient's Size	Length or size of the Patient, in meters	ANAP	COPY
(0010,1030)	3	DS	Patient's Weight	Weight of the Patient, in kilograms	ANAP	COPY
(0010,2180)	3	SH	Occupation	Occupation of the Patient	ANAP	COPY
(0010,21B0)	3	LT	Additional Patient History	Additional information about the Patient's medical history	ANAP	COPY

Table 54. Secondary Capture Image IOD – Module "General Series"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0060)	1	CS	Modality	Type of device, process or method that originally acquired or produced the data used to create the Instances in this Series. As of v8.4, the value is hardcoded as "OT".	ALWAYS	AUTO
(0020,000E)	1	UI	Series Instance UID	Unique identifier of the Series. The Viewer reuses the value from the first object in series where Series Number = "100000" and Series Description = "Secondary captures" and Modality = "OT", otherwise	ALWAYS	COPY, AUTO

Tag	Type	VR	Name	Description	PoV	Source
				creates a new one.		
(0020,0011)	2	IS	Series Number	A number that identifies this Series. Always "100000".	ALWAYS	AUTO
(0020,0060)	2C	CS	Laterality	Laterality of (paired) body part examined	VNAP	COPY
(0008,0021)	3	DA	Series Date	Date the Series started. The Viewer reuses the value from the first object in series where Series Number = "100000" and Series Description = "Secondary captures" and Modality = "OT", otherwise creates a new one.	ALWAYS	COPY, AUTO
(0008,0031)	3	TM	Series Time	Time the Series started. The Viewer reuses the value from the first object in series where Series Number = "100000" and Series Description = "Secondary captures" and Modality = "OT", otherwise creates a new one.	ALWAYS	COPY, AUTO
(0008,103E)	3	LO	Series Description	Description of the Series. Always "Secondary captures".	ALWAYS	AUTO
(0008,1070)	3	PN	Operators' Name	Name(s) of the operator(s) supporting the Series	ANAP	COPY
(0018,0015)	3	CS	Body Part Examined	Text description of the part of the body examined	ANAP	COPY
(0018,1030)	3	LO	Protocol Name	User-defined description of the conditions under which the Series was performed	ANAP	COPY

Table 55. Secondary Capture Image IOD – Module "General Equipment"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0070)	2	LO	Manufacturer	Manufacturer of the equipment that produced the Composite Instances	VNAP	COPY
(0008,0080)	3	LO	Institution Name	Institution where the equipment that produced the Composite Instances is located	ANAP	COPY
(0008,0081)	3	ST	Institution Address	Mailing address of the institution where the equipment that produced the Composite Instances is located	ANAP	COPY
(0008,1010)	3	SH	Station Name	User defined name identifying the machine that produced the Composite Instances	ANAP	COPY
(0008,1040)	3	LO	Institutional Department Name	Department in the institution where the equipment that produced the Composite Instances is located	ANAP	COPY
(0008,1090)	3	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that produced the Composite Instances	ANAP	COPY
(0018,1000)	3	LO	Device Serial Number	Manufacturer's serial number of the equipment that produced the Composite Instances	ANAP	COPY
(0018,1020)	3	LO	Software Versions	Manufacturer's designation of software version of the equipment that produced the Composite Instances	ANAP	COPY

Table 56. Secondary Capture Image IOD – Module "SC Equipment"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0064)	1	CS	Conversion Type	Describes the kind of image conversion. Always "WSD".	ALWAYS	AUTO
(0018,1016)	3	LO	Secondary Capture Device Manufacturer	Manufacturer of the Secondary Capture Device. Always "Softneta".	ALWAYS	AUTO
(0018,1018)	3	LO	Secondary Capture Device Manufacturer's Model Name	Manufacturer's model number of the Secondary Capture Device. Always "MedDream".	ALWAYS	AUTO
(0018,1019)	3	LO	Secondary Capture Device Software Versions	Manufacturer's designation of software version of the Secondary Capture Device. Set to the Viewer's version string.	ALWAYS	AUTO

Table 57. Secondary Capture Image IOD – Module "General Image"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0023)	2C	DA	Content Date	The date the image pixel data creation started. Set to date the screen was captured.	ALWAYS	AUTO
(0008,0033)	2C	TM	Content Time	The time the image pixel data creation started. Set to time the screen was captured.	ALWAYS	AUTO
(0020,0013)	2	IS	Instance Number	A number that identifies this image. The Viewer attempts to find a series where Series Number = "100000" and Series Description = "Secondary captures", then uses its number of instances plus one. Otherwise (for a new series) the value is "1".	ALWAYS	COPY, AUTO
(0020,0020)	2C	CS	Patient Orientation	Patient direction of the rows and columns of the image. Always an empty string.	EMPTY	AUTO
(0020,4000)	3	LT	Image Comments	User-defined comments about the image. Generated by combining some non-empty attributes from the annotated image (Series Description, Instance Number and, for multiframe images, a 1-based index into frames). Values are separated by spaces.	VNAP	AUTO
(0028,2110)	3	CS	Lossy Image Compression	Specifies whether an Image has undergone lossy compression (at a point in its lifetime). Always "01" due to JPEG format.	ALWAYS	AUTO

Tag	Type	VR	Name	Description	PoV	Source
(0008,1140)	3	SQ	Referenced Image Sequence	Other images significantly related to this image. Always contains a single Item that refers to the annotated image. Even if the screenshot contains rendering of some Presentation State over the image, that state object is not referenced anywhere (its dedicated container, Referenced Instance Sequence, is not supported by Viewer).	ALWAYS	AUTO
>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Set to SOP Class of the annotated image.	ALWAYS	COPY
>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance. Set to SOP Instance UID of the annotated image.	ALWAYS	COPY
>(0008,1160)	1C	IS	Referenced Frame Number	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. A single 1-based index of current frame is present when annotating a multiframe image.	ANAP	AUTO

Tag	Type	VR	Name	Description	PoV	Source
(0028,0002)	1	US	Samples per Pixel	Number of samples (planes) in this image. Always "3".	ALWAYS	AUTO
(0028,0004)	1	CS	Photometric Interpretation	Specifies the intended interpretation of the pixel data. Always "YBR_FULL_422".	ALWAYS	AUTO
(0028,0006)	1	US	Planar Configuration	Indicates whether the pixel data are encoded color-by-plane or color-by-pixel. Required if Samples per Pixel (0028,0002) has a value greater than 1. Always "0" due to JPEG format.	ALWAYS	AUTO
(0028,0010)	1	US	Rows	Number of rows in the image. Set to number of rows in the JPEG image sent by the client side.	ALWAYS	AUTO
(0028,0011)	1	US	Columns	Number of columns in the image. Set to number of columns in the JPEG image sent by the client side.	ALWAYS	AUTO
(0028,0100)	1	US	Bits Allocated	Number of bits allocated for each pixel sample.	ALWAYS	AUTO

Tag	Type	VR	Name	Description	PoV	Source
				Always "8".		
(0028,0101)	1	US	Bits Stored	Number of bits stored for each pixel sample. Always "8".	ALWAYS	AUTO
(0028,0102)	1	US	High Bit	Most significant bit for pixel sample data. Always "7".	ALWAYS	AUTO
(0028,0103)	1	US	Pixel Represent-ation	Data representation of the pixel samples. Always "0" (unsigned integer).	ALWAYS	AUTO
(7FE0,0010)	OB	1C	Pixel Data	A data stream of the pixel samples that comprise the Image. Required if Pixel Data Provider URL (0028,7FE0) is not present. Contains a JPEG image sent by client side (created in the browser). A single Fragment preceded with an empty Basic Offset Table.	ALWAYS	AUTO

Table 60. Secondary Capture Image IOD – Module "SOP Common"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0005)	1C	CS	Specific Character Set	Character Set that expands or replaces the Basic Graphic Set. Possible sources, in the following order: 1) If the setting "com.softneta.dicomParser.default-CharsetOverride" is true, then a non-empty value of the setting "com.soft-neta.dicomParser.defaultCharset" is used. 2) If the same attribute in the image being annotated is not empty, then a copy is used. 3) Otherwise, a non-empty value of the defaultCharset setting is used. NOTE: if this setting is configured, then ANAP becomes ALWAYS.	ANAP	COPY, CONFIG
(0008,0016)	1	UI	SOP Class UID	Uniquely identifies the SOP Class. Always "1.2.840.10008.5.1.4.1.1.7".	ALWAYS	AUTO
(0008,0018)	1	UI	SOP Instance UID	Uniquely identifies the SOP Instance. Always a new UID.	ALWAYS	AUTO

8.1.1.2 Key Object Selection Document IOD

Table 61. Key Object Selection Document IOD – Use of Modules

IE	Module	Usage
Patient	Patient	MANDATORY
Study	General Study	MANDATORY
	Patient Study	OPTIONAL
Series	Key Object Document Series	MANDATORY
Equipment	General Equipment	MANDATORY

SR Document			Key Object Document		MANDATORY	
			SR Document Content		MANDATORY	
			SOP Common		MANDATORY	

The General Equipment module is not mandatory in the standard but is always present in KO instances produced by Viewer.

Table 62. Key Object Selection Document IOD – Module "Patient"

Tag	Type	VR	Name	Description	PoV	Source
(0010,0010)	2	PN	Patient's Name	Patient's full name	VNAP	COPY
(0010,0020)	2	LO	Patient ID	Primary identifier for the Patient. The setting "com.softneta.meddream.newObjectsUseMetadataFromPacs" controls whether the value is copied from file or from PACS-indexed metadata.	VNAP	COPY
(0010,0021)	3	LO	Issuer of Patient ID	Identifier of the Assigning Authority (system, organization, agency, or department) that issued the Patient ID.	ANAP	COPY
(0010,0030)	2	DA	Patient's Birth Date	Birth date of the Patient	VNAP	COPY
(0010,0032)	3	TM	Patient's Birth Time	Birth time of the Patient	ANAP	COPY
(0010,0040)	2	CS	Patient's Sex	Sex of the Patient	VNAP	COPY
(0010,1000)	3	LO	Other Patient IDs (RETIRED)	Other identification numbers or codes used to identify the patient	ANAP	COPY
(0010,1001)	3	PN	Other Patient Names	Other names used to identify the Patient	ANAP	COPY
(0010,2160)	3	SH	Ethnic Group	Ethnic group or race of the Patient	ANAP	COPY
(0010,4000)	3	LT	Patient Comments	User-defined additional information about the Patient	ANAP	COPY

Table 63. Key Object Selection Document IOD – Module "General Study"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0020)	2	DA	Study Date	Date the Study started	VNAP	COPY
(0008,0030)	2	TM	Study Time	Time the Study started	VNAP	COPY
(0008,0050)	2	SH	Accession Number	A departmental Information System generated number that identifies the Imaging Service Request	VNAP	COPY
(0008,0090)	2	PN	Referring Physician's Name	Name of the Patient's referring physician	VNAP	COPY
(0008,1030)	2	LO	Study Description	Institution-generated description or classification of the Study (component) performed	VNAP	COPY
(0020,000D)	1	UI	Study Instance UID	Unique identifier for the Study	ALWAYS	COPY
(0020,0010)	2	SH	Study ID	User or equipment generated Study identifier	VNAP	COPY

Table 64. Secondary Capture Image IOD – Module "Patient Study"

Tag	Type	VR	Name	Description	PoV	Source
(0008,1080)	3	LO	Admitting Diagnoses Description	Description of the admitting diagnosis (diagnoses).	ANAP	COPY
(0010,1010)	3	AS	Patient's Age	Age of the Patient	ANAP	COPY
(0010,1020)	3	DS	Patient's Size	Length or size of the Patient, in meters	ANAP	COPY
(0010,1030)	3	DS	Patient's Weight	Weight of the Patient, in kilograms	ANAP	COPY
(0010,2180)	3	SH	Occupation	Occupation of the Patient	ANAP	COPY

Tag	Type	VR	Name	Description	PoV	Source
(0010,21B0)	3	LT	Additional Patient History	Additional information about the Patient's medical history	ANAP	COPY

Table 65. Key Object Selection Document IOD – Module "Key Object Document Series"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0021)	3	DA	Series Date	Date the Series started. Set to date the KO was created.	ALWAYS	AUTO
(0008,0031)	3	TM	Series Time	Time the Series started. Set to time the KO was created.	ALWAYS	AUTO
(0008,0060)	1	CS	Modality	Type of device, process or method that created the Instances in this Series. Always "KO".	ALWAYS	AUTO
(0008,103E)	3	LO	Series Description	Description of the Series. Always "Series of Key Object inst-ances".	ALWAYS	AUTO
(0008,1111)	2	SQ	Referenced Per-formed Procedure Step Sequence	Uniquely identifies the Performed Procedure Step SOP Instance for which the Series is created. Always empty.	EMPTY	AUTO
(0018,1030)	3	LO	Protocol Name	User-defined description of the conditions under which the Series was performed	ANAP	COPY
(0020,000E)	1	UI	Series Instance UID	Unique identifier of the Series. Always a new UID. (Every subsequ-ent KO instance is saved to a new series.)	ALWAYS	AUTO
(0020,0011)	1	IS	Series Number	A number that identifies the Series. Always a new value: the number of series in the study, with a minus sign. (Subsequent KOs get a Series Number "-1", "-2", etc.)	ALWAYS	AUTO

Table 66. Key Object Selection Document IOD – Module "General Equipment"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0070)	2	LO	Manufacturer	Manufacturer of the equipment that produced the Composite Instances. Always "Softneta".	ALWAYS	AUTO
(0008,1090)	3	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that produced the Composite Instances. Always "MedDream".	ALWAYS	AUTO
(0018,1020)	3	LO	Software Versions	Manufacturer's designation of soft-ware version of the equipment that produced the Composite Instances. Set to the Viewer's version string.	ALWAYS	AUTO

Tag	Type	VR	Name	Description	PoV	Source
(0020,0013)	1	IS	Instance Number	A number that identifies the Document. Always "0" due to a new series.	ALWAYS	AUTO
(0008,0023)	1	DA	Content Date	The date the image pixel data creation started. Set to date the KO was created.	ALWAYS	AUTO
(0008,0033)	1	TM	Content Time	The time the image pixel data creation started. Set to time the KO was created.	ALWAYS	AUTO
(0040,A375)	1	SQ	Current Reques-ted Procedure Ev-idence Sequence	List of all Composite SOP Instances referenced in the Content Sequence (0040,A730). Contains at least one Item.	ALWAYS	AUTO
>(0008,1115)	1	SQ	Referenced Se-ries Sequence	Sequence of Items where each Item includes the Attributes of a Series containing referenced Composite Object(s). Contains at least one Item.	ALWAYS	AUTO
>>(0020,000E)	1	UI	Series Instance UID	Unique identifier of a Series that is part of this Study and contains the referenced Composite Object(s)	ALWAYS	AUTO
>>(0008,1199)	1	SQ	Referenced SOP Sequence	References to Composite Object SOP Class/SOP Instance pairs that are part of the Study defined by Study Instance UID and the Series defined by Series Instance UID (0020,000E). Contains at least one Item.	ALWAYS	AUTO
>>>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Set to SOP Class of the marked image.	ALWAYS	AUTO
>>>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance. Set to SOP Instance UID of the marked image.	ALWAYS	AUTO
>(0020,000D)	1	UI	Study Instance UID	Unique identifier for the Study	ALWAYS	COPY

Due to limitations imposed by the Standard, the Key Object Document module doesn't contain references to individual frames of a temporal multiframe image. These are provided in the SR Document module which also must duplicate the UIDs of referenced images.

Table 68. Key Object Selection Document IOD – Module "SR Document"

Tag	Type	VR	Name	Description	PoV	Source
(0040,A040)	1	CS	Value Type	The type of the value encoded in this Content Item. Possible values: "CONTAINER" in the Root Content Item, "IMAGE" and	ALWAYS	AUTO

				"TEXT" below it.		
(0040,A043)	1C	SQ	Concept Name Code Sequence	Code describing the concept represented by this Content Item. Contains a single Item. Not present when used together with value type IMAGE.	ANAP	AUTO
>(0008,0100)	1C	SH	Code Value	The identifier of the Coded Entry. Possible values: "113000" in the Root Content Item, "113002" for Content Item with value type TEXT. Always present.	ALWAYS	AUTO
>(0008,0102)	1C	SH	Coding Scheme Designator	The identifier of the coding scheme in which the Coded Entry is defined. Always "DCM".	ALWAYS	AUTO
>(0008,0104)	1	LO	Code Meaning	Text that conveys the meaning of the Coded Entry. Possible values: "Of Interest" in the Root Content Item, "Key Object Description" for Content Item with value type TEXT.	ALWAYS	AUTO
(0040,A050)	1	CS	Continuity of Content	This flag specifies for a CONTAINER whether or not its contained Content Items are logically linked in a continuous textual flow, or are separate Items. Always "SEPARATE". Always present at root level and absent below.	ALWAYS	AUTO
(0040,A730)	1C	SQ	Content Sequence	Conveys content that is the Target of Relationships with the enclosing Source Content Item. Contains one Item with value type TEXT, and one or more Items with value type IMAGE. (In case of multiple frames in a temporal multiframe image, every frame gets its own Item with the same UIDs and a different Referenced Frame Number). Always present in the Root Content Item, and absent below it.	ANAP	AUTO
>(0040,A010)	1	CS	Relationship Type	The type of relationship between the (enclosing) Source Content Item and the Target Content Item. Always "CONTAINS". Present in every Item.	ALWAYS	AUTO
>(0040,A160)	1C	UT	Text Value	This is the value of the Content Item. Contains the key object title entered by the user. Present in the Item with value type TEXT.	ANAP	USER
>(0008,1199)	1C	SQ	Referenced SOP Sequence	References to Composite Object SOP Class/SOP Instance pairs.	ANAP	AUTO

Tag	Type	VR	Name	Description	PoV	Source
				Contains a single Item. Present in Items with value type IMAGE.		
>> (0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Set to SOP Class UID of the image marked by the user.	ALWAYS	AUTO
>> (0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance. Set to SOP Instance UID of the image marked by the user.	ALWAYS	AUTO
>> (0008,1160)	1C	IS	Referenced Frame Number	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. Present when annotating a temporal Multiframe image, and contains a single frame number starting at 1.	ANAP	AUTO

Table 69. Key Object Selection Document IOD – Module "SOP Common"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0005)	1C	CS	Specific Character Set	Character Set that expands or replaces the Basic Graphic Set. Possible sources, in the following order: 1) If the setting "com.softneta.dicomParser.defaultCharsetOverride" is true, then a non-empty value of the setting "com.softneta.dicomParser.defaultCharset" is used. 2) If the same attribute in the first marked image is not empty, then a copy is used. 3) Otherwise, a non-empty value of the defaultCharset setting is used. NOTE: if this setting is configured, then ANAP becomes ALWAYS.	ANAP	COPY, CONFIG
(0008,0016)	1	UI	SOP Class UID	Uniquely identifies the SOP Class. Always "1.2.840.10008.5.1.4.1.1.88.59".	ALWAYS	AUTO
(0008,0018)	1	UI	SOP Instance UID	Uniquely identifies the SOP Instance. Always a new UID.	ALWAYS	AUTO

8.1.1.3 Grayscale Softcopy Presentation State IOD

Table 70. Grayscale Softcopy Presentation State IOD – Use of Modules

IE	Module	Usage
Patient	Patient	MANDATORY
Study	General Study	MANDATORY
	Patient Study	OPTIONAL
Series	General Series	MANDATORY
	Presentation Series	MANDATORY
Equipment	General Equipment	MANDATORY
Presentation	Presentation State Identification	MANDATORY
	Presentation State Relationship	MANDATORY

			Displayed Area	MANDATORY
			Graphic Annotation	OPTIONAL
			Spatial Transformation	MANDATORY
			Graphic Layer	OPTIONAL
			Softcopy VOI LUT	OPTIONAL
			Softcopy Presentation LUT	MANDATORY
			SOP Common	MANDATORY

The General Equipment and Spatial Transformation modules are not mandatory in the standard but are always present in GSPS instances produced by Viewer.

The modules Display Shutter and Bitmap Display Shutter are optional in the standard and not supported by Viewer neither for creation nor for display. As a result, the mandatory Presentation State Shutter module related to them is not applicable. The same situation is with the optional Mask module and a related mandatory Presentation State Mask module.

Table 71. Grayscale Softcopy Presentation State IOD – Module "Patient"

Tag	Type	VR	Name	Description	PoV	Source
(0010,0010)	2	PN	Patient's Name	Patient's full name	VNAP	COPY
(0010,0020)	2	LO	Patient ID	Primary identifier for the Patient. The setting "com.softneta.meddream. newObjectsUseMetadataFromPacs" controls whether the value is copied from file or from PACS-indexed metadata.	VNAP	COPY
(0010,0021)	3	LO	Issuer of Patient ID	Identifier of the Assigning Authority (system, organization, agency, or department) that issued the Patient ID.	ANAP	COPY
(0010,0030)	2	DA	Patient's Birth Date	Birth date of the Patient	VNAP	COPY
(0010,0032)	3	TM	Patient's Birth Time	Birth time of the Patient	ANAP	COPY
(0010,0040)	2	CS	Patient's Sex	Sex of the Patient	VNAP	COPY
(0010,1000)	3	LO	Other Patient IDs (RETIRED)	Other identification numbers or codes used to identify the patient	ANAP	COPY
(0010,1001)	3	PN	Other Patient Names	Other names used to identify the Patient	ANAP	COPY
(0010,2160)	3	SH	Ethnic Group	Ethnic group or race of the Patient	ANAP	COPY
(0010,4000)	3	LT	Patient Comments	User-defined additional information about the Patient	ANAP	COPY

Table 72. Grayscale Softcopy Presentation State IOD – Module "General Study"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0020)	2	DA	Study Date	Date the Study started	VNAP	COPY
(0008,0030)	2	TM	Study Time	Time the Study started	VNAP	COPY
(0008,0050)	2	SH	Accession Number	A departmental Information System generated number that identifies the Imaging Service Request	VNAP	COPY
(0008,0090)	2	PN	Referring Physician's Name	Name of the Patient's referring physician. Always empty.	EMPTY	AUTO
(0008,1030)	2	LO	Study Description	Institution-generated description or classification of the Study (compo-nent) performed	VNAP	COPY
(0020,000D)	1	UI	Study Instance UID	Unique identifier for the Study	ALWAYS	COPY
(0020,0010)	2	SH	Study ID	User or equipment generated Study identifier	VNAP	COPY

Tag	Type	VR	Name	Description	PoV	Source
(0008,1080)	3	LO	Admitting Diagnoses Description	Description of the admitting diagnosis (diagnoses).	ANAP	COPY
(0010,1010)	3	AS	Patient's Age	Age of the Patient	ANAP	COPY
(0010,1020)	3	DS	Patient's Size	Length or size of the Patient, in meters	ANAP	COPY
(0010,1030)	3	DS	Patient's Weight	Weight of the Patient, in kilograms	ANAP	COPY
(0010,2180)	3	SH	Occupation	Occupation of the Patient	ANAP	COPY
(0010,21B0)	3	LT	Additional Patient History	Additional information about the Patient's medical history	ANAP	COPY

Table 74. Grayscale Softcopy Presentation State IOD – Module "General Series"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0021)	3	DA	Series Date	Date the Series started. Set to date the GSPS was created.	ALWAYS	AUTO
(0008,0031)	3	TM	Series Time	Time the Series started. Set to time the GSPS was created.	ALWAYS	AUTO
(0008,0060)	1	CS	Modality	Type of device, process or method that originally acquired or produced the data used to create the Instances in this Series	ALWAYS	AUTO
(0008,103E)	3	LO	Series Description	Description of the Series. Always "Series of Presentation States instances".	ALWAYS	AUTO
(0020,000E)	1	UI	Series Instance UID	Unique identifier of the Series. Always a new UID. (Every subsequent GSPS instance is saved to a new series.)	ALWAYS	AUTO
(0020,0011)	1	IS	Series Number	A number that identifies the Series. Always a new value: the number of series in the study, with a minus sign. (Subsequent GSPSs get a Series Number "-1", "-2", etc.)	ALWAYS	AUTO
(0020,0060)	2C	CS	Laterality	Laterality of (paired) body part examined. Empty if not present in the image being annotated.	VNAP	COPY
(0008,1070)	3	PN	Operators' Name	Name(s) of the operator(s) supporting the Series	ANAP	COPY
(0018,0015)	3	CS	Body Part Examined	Text description of the part of the body examined	ANAP	COPY
(0018,1030)	3	LO	Protocol Name	User-defined description of the conditions under which the Series was performed	ANAP	COPY

Table 75. Grayscale Softcopy Presentation State IOD – Module "Presentation Series"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0060)	1	CS	Modality	Type of device, process or method that created the Instances in this	ALWAYS	AUTO

				Series. Always "PR".		

Tag	Type	VR	Name	Description	PoV	Source
(0008,0070)	2	LO	Manufacturer	Manufacturer of the equipment that produced the Composite Instances. Always "Softneta".	ALWAYS	AUTO
(0008,1090)	3	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that produced the Composite Instances. Always "MedDream".	ALWAYS	AUTO
(0018,1020)	3	LO	Software Versions	Manufacturer's designation of software version of the equipment that produced the Composite Instances. Set to the Viewer's version string.	ALWAYS	AUTO

Tag	Type	VR	Name	Description	PoV	Source
(0020,0013)	1	IS	Instance Number	A number that identifies this SOP Instance. Always "0" (a new series is always created for each GSPS).	ALWAYS	AUTO
(0070,0080)	1	CS	Content Label	A label that is used to identify this SOP Instance. Always "PRESENTATION".	ALWAYS	AUTO
(0070,0081)	2	LO	Content Description	A description of the content of the SOP Instance. The value is entered by the user as "Description" when saving annotations.	ALWAYS	USER
(0070,0082)	1	DA	Presentation Creation Date	Date on which this presentation was created	ALWAYS	AUTO
(0070,0083)	1	TM	Presentation Creation Time	Time at which this presentation was created	ALWAYS	AUTO
(0070,0084)	3	PN	Content Creator's Name	Name of operator (such as a technologist or physician) creating the content of the SOP Instance. The username of the current logged in user (from the Login window) or, for URL integration sessions, a common username configured by the setting "authentication.his.username". The suffix "^^" is appended automatically.	ALWAYS	USER, CONFIG

Tag	Type	VR	Name	Description	PoV	Source
(0008,1115)	1	SQ	Referenced Series	Sequence of Items where each Item	ALWAYS	AUTO

Tag	Type	VR	Name	Description	PoV	Source
			Sequence	includes the Attributes of one Series to which the Presentation applies. Always contains a single Item.		
>(0020,000E)	1	UI	Series Instance UID	Unique identifier of a Series that is part of the Study defined by the Study Instance UID (0020,000D) in the enclosing Data Set. Refers to the series of the annotated image.	ALWAYS	COPY
> (0008,1140)	1	SQ	Referenced Image Sequence	The set of images and frames to which the Presentation applies. Always contains a single Item.	ALWAYS	AUTO
>> (0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Set to SOP Class of the annotated image.	ALWAYS	COPY
>> (0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance. Set to SOP Instance UID of the annotated image.	ALWAYS	COPY
>> (0008,1160)	1C	IS	Referenced Frame Number	Identifies the frame numbers within the Referenced SOP Instance to which the reference applies. The first frame shall be denoted as frame number 1. Present when annotating a multi-frame image, and can only have a single value.	ANAP	AUTO

A GSPS created by Viewer is always intended for a single image.

Table 79 . Grayscale Softcopy Presentation State IOD – Module "Displayed Area"

Tag	Type	VR	Name	Description	PoV	Source
(0070,005A)	1	SQ	Displayed Area Selection Sequence	A Sequence of Items each of which describes the displayed area selection for a group of images or frames. Always contains a single Item.	ALWAYS	AUTO
>(0070,0052)	1	SL	Displayed Area Top Left Hand Corner	The top left (after spatial transformation) pixel in the referenced image to be displayed, given as column\row. Column is the horizontal (before spatial transformation) offset (X) and row is the vertical (before spatial transformation) offset (Y) relative to the origin of the pixel data before spatial transformation, which is 1\1.	ALWAYS	AUTO
>(0070,0053)	1	SL	Displayed Area Bottom Right Hand Corner	The bottom right (after spatial transformation) pixel in the referenced image to be displayed, given as column\row. Column is the horizontal (before spatial transformation) offset (X) and row is	ALWAYS	AUTO

Tag	Type	VR	Name	Description	PoV	Source
				the vertical (before spatial transformation) offset (Y) relative to the origin of the pixel data before spatial transformation, which is 1\1.		
>(0070,0100)	1	CS	Presentation Size Mode	Manner of selection of display size. Enumerated Values: "SCALE TO FIT", "TRUE SIZE".	ALWAYS	AUTO
>(0070,0102)	1C	IS	Presentation Pixel Aspect Ratio	Ratio of the vertical size and the horizontal size of the pixels in the referenced image, to be used to display the referenced image, specified by a pair of integer values where the first value is the vertical pixel size and the second value is the horizontal pixel size. When creating the GSPS, is copied from the image being annotated. When applying the GSPS, this attribute is ignored.	ALWAYS	AUTO

The standard value "MAGNIFY" of Presentation Size Mode is never used in GSPS instances created by Viewer.

Table 80. Grayscale Softcopy Presentation State IOD – Module "Graphic Annotation"

Tag	Type	VR	Name	Description	PoV	Source
(0070,0001)	1	SQ	Graphic Annotation Sequence	A Sequence of Items each of which represents a group of annotations composed of graphics or text or both. Contains at least one Item.	ALWAYS	AUTO
>(0070,0002)	1	CS	Graphic Layer	The layer defined in the Graphic Layer Module in which the graphics or text is to be rendered.	ALWAYS	AUTO
>(0070,0008)	1C	SQ	Text Object Sequence	Sequence that describes a text annotation. Either this attribute or Graphic Object Sequence, or both, are required. Present if a measurement contains text objects. Contains at least one Item.	ANAP	AUTO
>>(0070,0003)	1C	CS	Bounding Box Annotation Units	Units of measure for the axes of the text bounding box. Required if Bounding Box Top Left Hand Corner or Bounding Box Bottom Right Hand Corner is present. The Viewer always adds this attribute with value "PIXEL": Image relative position specified with sub-pixel resolution such that the origin, which is at the Top Left Hand Corner (TLHC) of the TLHC pixel is 0.0\0.0, the Bottom Right Hand Corner (BRHC) of the TLHC pixel is 1.0\1.0, and the BRHC of the BRHC pixel is Columns\Rows.	ALWAYS	AUTO
>>(0070,0004)	1C	CS	Bounding Box Annotation Units	Units of measure for the axes of the text anchor point annotation.	ALWAYS	AUTO

				Required if Anchor Point is present. The Viewer always adds this attribute with value "PIXEL".		
>>(0070,0006)	1	ST	Unformatted Text Value	Text data that is unformatted and whose manner of display within the defined bounding box or relative to the specified anchor point is implementation dependent. Contains user-entered text (for the measurement "Text") or autogenerated text (for most other measurements).	ALWAYS	USER, AUTO
>>(0070,0010)	1C	FL	Bounding Box Top Left Hand Corner	Location of the Top Left Hand Corner (TLHC) of the bounding box in which Unformatted Text Value is to be dis-played, in Bounding Box Annotation Units, given as column\row. Column is the horizontal offset and row is the vertical offset. Required if Bounding Box Bottom Right Hand Corner is present. Always present with two values.	ALWAYS	AUTO
>>(0070,0011)	1C	FL	Bounding Box Bottom Right Hand Corner	Location of the Bottom Right Hand Corner (BRHC) of the bounding box in which Unformatted Text Value is to be displayed, in Bounding Box Annotation Units, given as column\row. Column is the horizontal offset and row is the vertical offset. Required if Bounding Box Top Left Hand Corner is present. Always present with two values.	ALWAYS	AUTO
>>(0070,0012)	1C	CS	Bounding Box Text Horizontal Justification	Location of the text relative to the vertical edges of the bounding box. Required if Bounding Box Top Left Hand Corner is present. The Viewer always adds this attribute with value "LEFT".	ALWAYS	AUTO
>>(0070,0014)	1C	FL	Anchor Point	Location of a point in the image or Specified Displayed Area to which the Unformatted Text Value is related, in Anchor Point Annotation Units, given as column\row. Column is the horizontal offset and row is the vertical offset. Required if Bounding Box Top Left Hand Corner and Bounding Box Bottom Right Hand Corner are not present.	ALWAYS	AUTO
>>(0070,0015)	1C	CS	Anchor Point Visibility	Flag to indicate whether or not a visible indication (such as a line or arrow) of the relationship between the text and the anchor point is to be displayed. Required if Anchor Point is present.	ALWAYS	AUTO

				Enumerated Values: "Y", "N". The Viewer may use "Y" if the measurement has been edited manually by moving the text away from its original location.		
>>(0070,0231)	3	SQ	Text Style Sequence	Sequence that describes the text style. Always present with a single Item.	ALWAYS	AUTO
>>>(0070,0229)	1	LO	CSS Font Name	Generic font name as defined within CSS (Cascading Style Sheets). The Viewer always uses "Arial".	ALWAYS	AUTO
>>>(0070,0241)	1	US	Text Color CIELab Value	A default color triplet value used to specify the text color in which it is recommended that the text be rendered on a color display. The units are specified in PCS-Values, and the value is encoded as CIELab.	ALWAYS	AUTO, CONFIG
>>>(0070,0242)	1C	CS	Horizontal Align-ment	Specifies the horizontal position of the text relative to the vertical edges of the bounding box. Required if Bounding Box Top Left Hand Corner is present. Enumerated Values: "LEFT", "CENTER", "RIGHT".	ALWAYS	AUTO
>>>(0070,0243)	1C	CS	Vertical Alignment	Specifies the vertical position of the text relative to the horizontal edges of the bounding box. Required if Bounding Box Top Left Hand Corner is present. Enumerated Values: "TOP", "CENTER", "BOTTOM".	ALWAYS	AUTO
>>>(0070,0244)	1	CS	Shadow Style	The shadow style of the text to be displayed. The Viewer always uses "OFF" (no shadow).	ALWAYS	AUTO
>>>(0070,0248)	1	CS	Underlined	Specifies whether or not the text shall be rendered underlined. The Viewer always uses "N" (no underline).	ALWAYS	AUTO
>>>(0070,0249)	1	CS	Bold	Specifies whether or not the text shall be rendered in bold. The Viewer always uses "N" (not bold).	ALWAYS	AUTO
>>>(0070,0250)	1	CS	Italic	Specifies whether or not the text shall be rendered italicized. The Viewer always uses "N" (not italic).	ALWAYS	AUTO
>(0070,0009)	1C	SQ	Graphic Object Sequence	Sequence that describes a graphic annotation. Either this attribute or Text Object Sequence, or both, are required.	ANAP	AUTO

				Present if a measurement contains graphic objects. Contains at least one Item.		
>>(0070,0005)	1	CS	Graphic Annotation Units	Units of measure for the axes of the graphic annotation. The Viewer always uses "PIXEL".	ALWAYS	AUTO
>>(0070,0020)	1	US	Graphic Dimensions	Always "2"	ALWAYS	AUTO
>>(0070,0021)	1	US	Number of Graphic Points	Number of data points in this graphic	ALWAYS	AUTO
>>(0070,0022)	1	FL	Graphic Data	Coordinates that specify this graphic annotation. Contains at least 2 values.	ALWAYS	AUTO
>>(0070,0023)	1	CS	Graphic Type	The shape of graphic that is to be drawn. Enumerated Values: "POINT", "POLYLINE", "INTERPOLATED", "CIRCLE", "ELLIPSE".	ALWAYS	AUTO
>>(0070,0024)	1C	CS	Graphic Filled	Whether or not the closed graphics element is displayed as filled (in some unspecified manner that shall be distinguishable from an outline) or as an outline. Required if Graphic Data is "closed". Enumerated Values: "Y", "N". Absent for some kinds of graphic primitives, like POINT.	ANAP	AUTO
>>(0070,0226)	3	UL	Compound Graphic Instance ID	The identifier of the Compound Graphic represented, in part, by this Item. The value shall be equal to the value of Compound Graphic Instance ID of the corresponding Item in the Compound Graphic Sequence. Present in case of "Ellipse" and "Arrow Pointer" measurements.	ANAP	AUTO
>>(0070,0232)	3	SQ	Line Style Sequence	Sequence that describes the line style. Contains a single Item. Absent in case of POINT.	ANAP	AUTO
>>>(0070,0244)	1	CS	Shadow Style	The shadow style of the line to be displayed. Always "OFF" (no shadow).	ALWAYS	AUTO
>>>(0070,0245)	1	FL	Shadow Offset X	Floating point value that defines the shadow offset in X direction in Graphic Annotation Units). Always 0.	ALWAYS	AUTO
>>>(0070,0246)	1	FL	Shadow Offset Y	Floating point value that defines the shadow offset in Y direction in Graphic Annotation Units (0070,0005). Always 0.	ALWAYS	AUTO
>>> (0070,0247)	1	FL	Shadow Color	A color triplet value used to encode	ALWAYS	CONFIG

			CIELab Value	the Shadow Color. The units are specified in PCS-Values, and the value is encoded as CIELab. Despite the fact that the shadow is not used, the value comes from "Measurements / Color" in Settings window.		
>>>(0070,0251)	1	US	Pattern On Color CIELab Value	A color triplet value used to encode the foreground. The units are specified in PCS-Values, and the value is encoded as CIELab. The value is configurable as "Measurements / Color" in Settings window.	ALWAYS	CONFIG
>>>(0070,0253)	1	FL	Line Thickness	Specifies the line thickness in pixels.	ALWAYS	AUTO, CONFIG
>>>(0070,0254)	1	CS	Line Dashing Style	The dashing style of the line to be displayed. Enumerated Values: "SOLID", "DASHED".	ALWAYS	AUTO
>>>(0070,0255)	1C	UL	Line Pattern	Pattern that defines the line dashing style. If the bit inside the pattern is set to 1 the foreground color is drawn, else the background color is drawn. Present when the dashing style is "DASHED", and the value is always 255.	ANAP	AUTO
>>>(0070,0258)	1	FL	Shadow Opacity	Encodes the shadow opacity. The value is encoded as floating point alpha value (0.0-1.0). Always zero.	ALWAYS	AUTO
>>>(0070,0284)	1	FL	Pattern On Opacity	Encodes the foreground opacity as floating point alpha value (0.0-1.0). The Viewer always uses 1.0.	ALWAYS	AUTO
>(0070,0209)	3	SQ	Compound Graphic Sequence	A Sequence of Items that describe Compound Graphics. Is present with at least one Item for measurements "Arrow Pointer" and "Oval", and absent otherwise.	ANAP	AUTO
>>(0070,0020)	1	US	Graphic Dimensions	Always "2"	ALWAYS	AUTO
>>(0070,0021)	1	US	Number of Graphic Points	Number of data Items, e.g., points, in this Compound Graphic	ALWAYS	AUTO
>>(0070,0022)	1	FL	Graphic Data	Numerical data Items that specify this Compound Graphic (points, vectors and scalars). Contains at least 2 values.	ALWAYS	AUTO
>>(0070,0024)	1C	CS	Graphic Filled	Indicates whether or not the Compound Graphics is displayed as filled. Required for "ELLIPSE" graphics.	ALWAYS	AUTO

				Enumerated values: "Y", "N".		
>>(0070,0226)	1	UL	Compound Graphic Instance ID	A number that identifies the Compound Graphic described in this Item. The value shall be unique within this SOP Instance.	ALWAYS	AUTO
>>(0070,0230)	3	FD	Rotation Angle	The rotation of this Compound Graphic in degrees. Value shall be in degrees, between 0 and 360. Present for "ELLIPSE" graphics.	ANAP	AUTO
>>(0070,0232)	3	SQ	Line Style Sequence	Sequence that describes the line style. Contains a single Item. Present for both "ELLIPSE" and "ARROW" graphics.	ALWAYS	AUTO
>>>(0070,0244)	1	CS	Shadow Style	The shadow style of the line to be displayed. Always "OFF" (no shadow).	ALWAYS	AUTO
>>>(0070,0245)	1	FL	Shadow Offset X	Floating point value that defines the shadow offset in X direction in Graphic Annotation Units). Always 0.	ALWAYS	AUTO
>>>(0070,0246)	1	FL	Shadow Offset Y	Floating point value that defines the shadow offset in Y direction in Graphic Annotation Units (0070,0005). Always 0.	ALWAYS	AUTO
>>>(0070,0251)	1	US	Pattern On Color CIELab Value	A color triplet value used to encode the foreground. The units are specified in PCS-Values, and the value is encoded as CIELab.	ALWAYS	AUTO, CONFIG
>>>(0070,0253)	1	FL	Line Thickness	Specifies the line thickness in pixels.	ALWAYS	AUTO, CONFIG
>>>(0070,0254)	1	CS	Line Dashing Style	The dashing style of the line to be displayed. Enumerated Values: "SOLID", "DASHED".	ALWAYS	AUTO
>>>(0070,0255)	1C	UL	Line Pattern	Pattern that defines the line dashing style. If the bit inside the pattern is set to 1 the foreground color is drawn, else the background color is drawn. Present when the dashing style is "DASHED", and the value is always 255.	ANAP	AUTO
>>>(0070,0284)	1	FL	Pattern On Opacity	Encodes the foreground opacity as floating point alpha value (0.0-1.0). The Viewer always uses 1.0.	ALWAYS	AUTO
>>(0070,0273)	1C	FL	Rotation Point	The rotation point of this Compound Graphic. Required if Rotation Angle is present.	ALWAYS	AUTO
>>(0070,0282)	1	CS	Compound Graphic Units	Type of dimension used in Attributes for the Compound Graphic when	ALWAYS	AUTO

Tag	Type	VR	Name	Description	PoV	Source
				specifying distances and locations. The Viewer always uses "PIXEL".		
>>(0070,0294)	1	CS	Compound Graphic Type	The shape of this Compound Graphic. The Viewer uses only "ARROW" and "ELLIPSE".	ALWAYS	AUTO

The Graphic Annotation module is not present if Viewer's "Save Annotations" command has been used when there are no unsaved measurements: then only image's viewable area, transformations or windowing are saved.

Table 81. Grayscale Softcopy Presentation State IOD – Module "Spatial Transformation"

Tag	Type	VR	Name	Description	PoV	Source
(0070,0041)	1	CS	Image Horizontal Flip	Whether or not to flip the image horizontally after any Image Rotation has been applied such that the left side of the image becomes the right side. Enumerated Values: "Y", "N".	ALWAYS	AUTO
(0070,0042)	1	US	Image Rotation	How far to rotate the image clockwise in degrees, before any Image Horizontal Flip (0070,0041) is applied. Enumerated Values: 270, 180, 90, 0.	ALWAYS	AUTO

Table 82. Grayscale Softcopy Presentation State IOD – Module "Graphic Layer"

Tag	Type	VR	Name	Description	PoV	Source
(0070,0060)	1	SQ	Graphic Layer Sequence	A Sequence of Items each of which represents a single layer in which overlays, graphics or text may be rendered. Contains at least one Item. The Viewer puts all graphic/text primitives of a particular measurement into a dedicated layer.	ALWAYS	AUTO
>(0070,0002)	1	CS	Graphic Layer	A string that identifies the layer. A generated value in the form "MEASUREMENT_" + ordinal number starting from 1. The Viewer uses a new layer for every measurement.	ALWAYS	AUTO
>(0070,0062)	1	IS	Graphic Layer Order	An integer indicating the order in which it is recommended that the layer be rendered, if the display is capable of distinguishing. Lower numbered layers are to be rendered first. The Viewer assigns numbers starting at 0 so that measurements created earlier are rendered first.	ALWAYS	AUTO
>(0070,0068)	3	LO	Graphic Layer Description	A free text description of the contents of this layer. Possible values identify the	ALWAYS	AUTO

| | | | | measurement:
"Measurement ruler",
"Measurement angle",
"Measurement polyline",
"Measurement cobb-angle",
"Measurement text",
"Measurement area",
"Measurement oval",
"Measurement norberg-angle, "<br>"Measurement vhs",
"Measurement roi",
"Measurement closed-polygon",
"Measurement volume",
"Measurement VTI",
"Measurement tibial-plateau-angle",
"Measurement tibial-tuberosity-advancement",
"Measurement cardiothoracic-ratio",
"Measurement tt-tg-distance",
"Measurement flat-foot",
"Measurement pencil",
"Measurement flexpoly",
"Measurement spine",
"Measurement arrow-pointer",
"Measurement hip-distraction-index",
"Measurement rectangle-area",
"Measurement vertebra-angle",
"Measurement goniometry",
"Measurement height". | | |

The Graphic Layer module is not present if Viewer's "Save Annotations" command has been used when there are no unsaved measurements: then only image's viewable area, transformations or windowing are saved.

Table 83. Grayscale Softcopy Presentation State IOD – Module "Softcopy VOI LUT"

Tag	Type	VR	Name	Description	PoV	Source
(0028,3110)	1	SQ	Softcopy VOI LUT Sequence	Defines a Sequence of VOI LUTs or Window Centers and Widths and to which images and frames they apply. Contains a single Item.	ALWAYS	AUTO
>(0028,1050)	1C	DS	Window Center	Window Center for display. Contains a single value.	ALWAYS	AUTO
>(0028,1051)	1C	DS	Window Width	Window Width for display. Contains a single value.	ALWAYS	AUTO

Table 84. Grayscale Softcopy Presentation State IOD – Module "Softcopy Presentation LUT"

Tag	Type	VR	Name	Description	PoV	Source
(2050,0020)	1C	CS	Presentation LUT Shape	Specifies predefined Presentation LUT transformation. Required if Presentation LUT Sequence (2050,0010) is absent. Always present with the value "IDENTITY".	ALWAYS	AUTO

Table 85. Grayscale Softcopy Presentation State IOD – Module "SOP Common"

Tag	Type	VR	Name	Description	PoV	Source

Tag	Type	VR	Name	Description	PoV	Source
(0008,0005)	1C	CS	Specific Character Set	Character Set that expands or replaces the Basic Graphic Set. Possible sources, in the following order: 1) If the setting "com.softneta.dicomParser.default-CharsetOverride" is true, then a non-empty value of the setting "com.soft-neta.dicomParser.defaultCharset" is used. 2) If the same attribute in the image being annotated is not empty, then a copy is used. 3) Otherwise, a non-empty value of the defaultCharset setting is used. NOTE: if this setting is configured, then ANAP becomes ALWAYS.	ANAP	COPY, CONFIG
(0008,0016)	1	UI	SOP Class UID	Uniquely identifies the SOP Class. Always "1.2.840.10008.5.1.4.1.1.1-1.1".	ALWAYS	AUTO
(0008,0018)	1	UI	SOP Instance UID	Uniquely identifies the SOP Instance. Always a new UID.	ALWAYS	AUTO

8.1.1.4   RT Structure Set IOD

Table 86. Use of Modules

IE	Module	Usage
Patient	Patient	MANDATORY
Study	General Study	MANDATORY
	Patient Study	OPTIONAL
Series	RT Series	MANDATORY
Equipment	General Equipment	MANDATORY
Structure Set	Structure Set	MANDATORY
	ROI Contour	MANDATORY
	RT ROI Observations	MANDATORY
	SOP Common	MANDATORY

The General Equipment and Frame of Reference modules are not mandatory in the standard but are always present in RTSTRUCT instances produced by Viewer.

The Frame of Reference module is mandatory in standard but not present here. The Viewer uses the RTSTRUCT format for its own annotations that don't fully correspond to real radiotherapy scenarios. In particular, copying a Frame of Reference UID from the object being annotated is not always possible: some studies like DX never contain it, while for other studies multiple series can be annotated with the same RTSTRUCT object and there is no checking whether their frames of reference are identical. An example with incompatible coordinate systems wasn't encountered so far.

Table 87. RT Structure Set IOD – Module "Patient"

Tag	Type	VR	Name	Description	PoV	Source
(0010,0010)	2	PN	Patient's Name	Patient's full name	VNAP	COPY
(0010,0020)	2	LO	Patient ID	Primary identifier for the Patient. The setting "com.softneta.meddream.newObjectsUseMetadataFromPacs" controls whether the value is copied from file or from PACS-indexed metadata.	VNAP	COPY

(0010,0021)	3	LO	Issuer of Patient ID	Identifier of the Assigning Authority (system, organization, agency, or department) that issued the Patient ID.	ANAP	COPY
(0010,0030)	2	DA	Patient's Birth Date	Birth date of the Patient	VNAP	COPY
(0010,0032)	3	TM	Patient's Birth Time	Birth time of the Patient	ANAP	COPY
(0010,0040)	2	CS	Patient's Sex	Sex of the Patient	VNAP	COPY
(0010,1000)	3	LO	Other Patient IDs (RETIRED)	Other identification numbers or codes used to identify the patient	ANAP	COPY
(0010,1001)	3	PN	Other Patient Names	Other names used to identify the Patient	ANAP	COPY
(0010,2160)	3	SH	Ethnic Group	Ethnic group or race of the Patient	ANAP	COPY
(0010,4000)	3	LT	Patient Comments	User-defined additional information about the Patient	ANAP	COPY

Table 88. RT Structure Set IOD – Module "General Study"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0020)	2	DA	Study Date	Date the Study started	VNAP	COPY
(0008,0030)	2	TM	Study Time	Time the Study started	VNAP	COPY
(0008,0050)	2	SH	Accession Number	A departmental Information System generated number that identifies the Imaging Service Request	VNAP	COPY
(0008,0090)	2	PN	Referring Physician's Name	Name of the Patient's referring physician. Always empty.	EMPTY	AUTO
(0008,1030)	2	LO	Study Description	Institution-generated description or classification of the Study (component) performed	VNAP	COPY
(0020,000D)	1	UI	Study Instance UID	Unique identifier for the Study	ALWAYS	COPY
(0020,0010)	2	SH	Study ID	User or equipment generated Study identifier	VNAP	COPY

Table 89. RT Structure Set IOD – Module "Patient Study"

Tag	Type	VR	Name	Description	PoV	Source
(0008,1080)	3	LO	Admitting Diagnoses Description	Description of the admitting diagnosis (diagnoses).	ANAP	COPY
(0010,1010)	3	AS	Patient's Age	Age of the Patient	ANAP	COPY
(0010,1020)	3	DS	Patient's Size	Length or size of the Patient, in meters	ANAP	COPY
(0010,1030)	3	DS	Patient's Weight	Weight of the Patient, in kilograms	ANAP	COPY
(0010,2180)	3	SH	Occupation	Occupation of the Patient	ANAP	COPY
(0010,21B0)	3	LT	Additional Patient History	Additional information about the Patient's medical history	ANAP	COPY

Table 90. RT Structure Set IOD – Module "RT Series"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0060)	1	CS	Modality	Type of device, process or method that originally acquired or produced the data used to create the Instances in this Series. Always "RTSTRUCT".	ALWAYS	AUTO
(0008,103E)	3	LO	Series Description	Description of the Series. Always "Series of 3D annotations instances".	ALWAYS	AUTO
(0008,1070)	2	PN	Operators' Name	Name(s) of the operator(s) supporting the Series	EMPTY	AUTO

Tag	Type	VR	Name	Description	PoV	Source
(0020,000E)	1	UI	Series Instance UID	Unique identifier of the Series. Automatically generated for a new series, or reused from existing RTSTRUCT series.	ALWAYS	AUTO, COPY
(0020,0011)	2	IS	Series Number	A number that identifies the Series. Reused from existing RTSTRUCT series, or generated as the number of series in the study with a minus sign. (Subsequent annotations get a Series Number "-1", "-2", etc.)	ALWAYS	AUTO

Table 91 . RT Structure Set IOD – Module "General Equipment"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0070)	2	LO	Manufacturer	Manufacturer of the equipment that produced the Composite Instances. Always "Softneta".	ALWAYS	AUTO
(0008,1090)	3	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that produced the Composite Instances. Always "MedDream".	ALWAYS	AUTO
(0018,1020)	3	LO	Software Versions	Manufacturer's designation of soft-ware version of the equipment that produced the Composite Instances. Set to the Viewer's version string.	ALWAYS	AUTO

Table 92 . RT Structure Set IOD – Module "Structure Set"

Tag	Type	VR	Name	Description	PoV	Source
(3006,0002)	1	SH	Structure Set Label	User-defined label for Structure Set. Always "Segm. regions".	ALWAYS	AUTO
(3006,0008)	2	DA	Structure Set Date	Date at which Structure Set was last modified. Uses the clock of the end user's machine.	ALWAYS	AUTO
(3006,0009)	2	TM	Structure Set Time	Time at which Structure Set was last modified. Uses the clock of the end user's machine.	ALWAYS	AUTO
(3006,0010)	3	SQ	Referenced Frame of Reference Sequence	Sequence describing Frames of Reference in which the ROIs are defined. Contains at least one Item.	ALWAYS	AUTO
>(0020,0052)	1	UI	Frame of Reference UID	Uniquely identifies Frame of Reference within Structure Set. Always a generated value, with prefix "1.3.6.1.4.1.44316.2". The generated value uniquely identifies the series of the object being annotated (is reused when annotating another image from	ALWAYS	AUTO

				the same series).		
>(3006,0012)	3	SQ	RT Referenced Study Sequence	Sequence of Studies containing Series to be referenced.	ALWAYS	AUTO
>>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Always "1.2.840.10008.3.1.2.3.1".	ALWAYS	AUTO
>>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance. Always set to Study Instance UID of the annotated object.	ALWAYS	AUTO
>>(3006,0014)	1	SQ	RT Referenced Series Sequence	Sequence describing Series of images within the referenced Study that are used in defining the Structure Set. Contains at least one Item.	ALWAYS	AUTO
>>>(0020,000E)	1	UI	Series Instance UID	Unique identifier for the Series containing the images.	ALWAYS	AUTO
>>>(3006,0016)	1	SQ	Contour Image Sequence	Sequence of Items describing images in a given Series used in defining the Structure Set (typically CT or MR images). Contains at least one Item.	ALWAYS	AUTO
>>>>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Set to SOP Class UID of the annotated object.	ALWAYS	AUTO
>>>>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance. Set to SOP Instance UID of the annotated object.	ALWAYS	AUTO
>>>>(0008,1160)	1C	US	Referenced Frame Number	Identifies 1-based frame numbers within the Referenced SOP Instance to which the reference applies. Present if a multiframe image is annotated.	ANAP	AUTO
(3006,0020)	1	SQ	Structure Set ROI Sequence	ROIs for current Structure Set. Contains at least one Item.	ALWAYS	AUTO
>(3006,0022)	1	IS	ROI Number	Identification number of the ROI	ALWAYS	AUTO
>(3006,0024)	1	UI	Referenced Frame of Reference UID	Uniquely identifies Frame of Reference in which ROI is defined, specified by Frame of Reference UID (0020,0052) in Referenced Frame of Reference Sequence (3006,0010).	ALWAYS	AUTO
>(3006,0026)	2	LO	ROI Name	User-defined name for ROI. Generated in the following form, depending on annotation type: "Bounding box " + ordinal number, "Free Draw " + ordinal number, "Smart Paint " + ordinal number.	ALWAYS	AUTO
>(3006,0028)	3	ST	ROI Description	User-defined description for ROI.	ALWAYS	AUTO

Tag	Type	VR	Name	Description	PoV	Source
				Contains machine–readable proprietary data for optimized processing/display, including an optional "annotation is deleted" flag.		
>(3006,0036)	2	CS	ROI Generation Algorithm	Type of algorithm used to generate ROI. Always "MANUAL".	ALWAYS	AUTO
>(3006,0038)	3	LO	ROI Generation Description	User-defined description of technique used to generate ROI. Machine-readable proprietary annotation type: "2D bounding box", "3D bounding box", "Smart paint", "Free hand draw".	ALWAYS	AUTO

Table 93 . RT Structure Set IOD – Module "ROI Contour"

Tag	Type	VR	Name	Description	PoV	Source
(3006,0039)	1	SQ	ROI Contour Sequence	Sequence of Contour Sequences defining ROIs. Contains at least one Item.	ALWAYS	AUTO
>(3006,002A)	3	IS	ROI Display Color	RGB triplet color representation for ROI, specified using the range 0-255	ALWAYS	AUTO, USER
>(3006,0040)	3	SQ	Contour Sequence	Sequence of Contours defining ROI. Contains at least one Item.	ALWAYS	AUTO
>>(3006,0016)	3	SQ	Contour Image Sequence	Sequence of images containing the contour. Contains at least one Item.	ALWAYS	AUTO
>>>(0008,1150)	1	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Set to SOP Class UID of the annotated object.	ALWAYS	AUTO
>>>(0008,1155)	1	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance. Set to SOP Instance UID of the annotated object.	ALWAYS	AUTO
>>(3006,0042)	1	CS	Contour Geometric Type	Geometric type of contour. Possible values: "CLOSED_PLANAR", "CLOSEDPLANAR_XOR".	ALWAYS	AUTO
>>(3006,0046)	1	IS	Number of Contour Points	Number of points (triplets) in Contour Data (3006,0050)	ALWAYS	AUTO
>>(3006,0048)	3	IS	Contour Number	Identification number of the contour	ALWAYS	AUTO
>>(3006,0050)	1	DS	Contour Data	Sequence of (x,y,z) triplets defining a contour in the Patient-Based Coordinate System. Due to floating point behavior in JavaScript, the values might have more significant digits (for example, 17 or even 18) than allowed by this VR.	ALWAYS	AUTO
>(3006,0084)	1	IS	Referenced ROI Number	Uniquely identifies the referenced ROI described in the Structure Set ROI Sequence (3006,0020)	ALWAYS	AUTO

Table 94 . RT Structure Set IOD – Module "RT ROI Observations

Tag	Type	VR	Name	Description	PoV	Source
(3006,0080)	1	SQ	RT ROI Observations Sequence	Sequence of observations related to ROIs defined in the Structure Set ROI Sequence (3006,0020) of the Structure Set Module	ALWAYS	AUTO
>(3006,0082)	1	IS	Observation Number	Identification number of the Observation	ALWAYS	AUTO
>(3006,0084)	1	IS	Referenced ROI Number	Uniquely identifies the referenced ROI described in the Structure Set ROI Sequence (3006,0020)	ALWAYS	AUTO
>(3006,00A4)	2	CS	RT ROI Interpreted Type	Type of ROI. Always empty: RT constants are unsuitable for generic annotations.	EMPTY	AUTO
>(3006,00A6)	2	PN	ROI Interpreter	Name of person performing the interpretation. Always empty: interpretation is not performed in an RT context.	EMPTY	AUTO

Table 95. RT Structure Set IOD – Module "SOP Common"

Tag	Type	VR	Name	Description	PoV	Source
(0008,0005)	1C	CS	Specific Character Set	Character Set that expands or replaces the Basic Graphic Set. Possible sources, in the following order: 1) If the setting "com.softneta.dicomParser.defaultCharsetOverride" is true, then a non-empty value of the setting "com.soft-neta.dicomParser.defaultCharset" is used. 2) If the same attribute in the image being annotated is not empty, then a copy is used. 3) Otherwise, a non-empty value of the defaultCharset setting is used. NOTE: if this setting is configured, then ANAP becomes ALWAYS.	ANAP	COPY, CONFIG
(0008,0016)	1	UI	SOP Class UID	Uniquely identifies the SOP Class. Always "1.2.840.10008.5.1.4.1.1.-481.3".	ALWAYS	AUTO
(0008,0018)	1	UI	SOP Instance UID	Uniquely identifies the SOP Instance. Always a new UID.	ALWAYS	AUTO
(0008,0201)	3	SH	Timezone Offset From UTC	Contains the offset from UTC to the timezone for Structure Set Date and Structure Set Time. Always present and comes from the end user's machine. Note that Study Date / Time and Patient's Birth Date / Time are copied from the object being annotated without correction by this offset; if the original object contains its own timezone offset, this information is lost.	ALWAYS	AUTO