Dicompass Gateway

DICOM Conformance Statement

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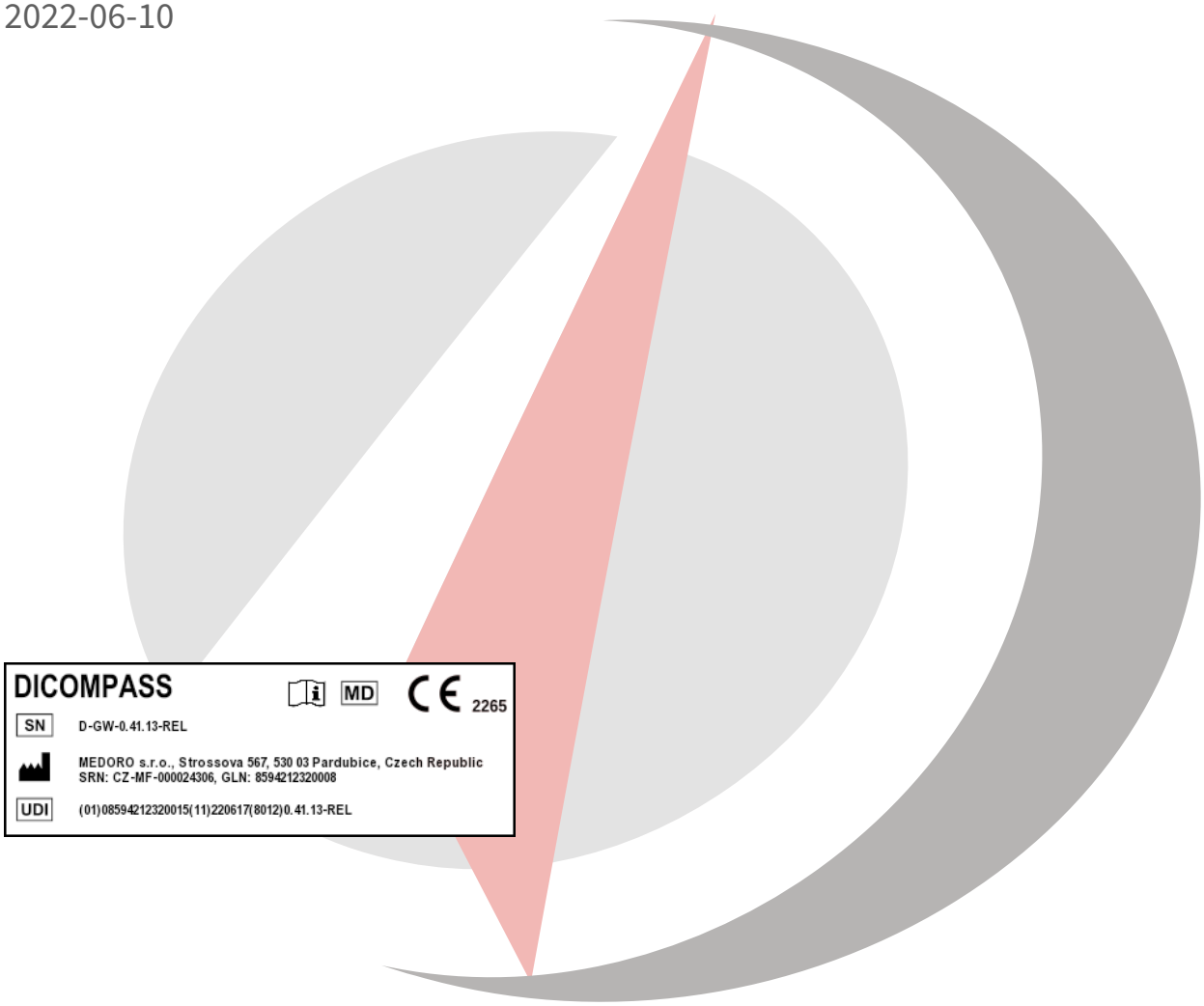

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1 Conformance Statement Overview

Dicompass Gateway is a networked computer system used for archiving, managing and viewing DICOM objects. It allows external systems to send DICOM objects to it for permanent storage, retrieve information about such objects, and retrieve the DICOM objects themselves.

1.1 Network Services

The following tables provide an overview of the supported network services:

1.1.1 Transfer

Table 1: Transfer

SOP Classes	User	Provider
Ambulatory ECG Waveform Storage	yes	yes
Arterial Pulse Waveform Storage	yes	yes
Audio SR Storage Trial - Retired	yes	yes
Autorefraction Measurements Storage	yes	yes
Basic Color Image Box SOP Class	yes	yes
Basic Film Box SOP Class	yes	yes
Basic Film Session SOP Class	yes	yes
Basic Grayscale Image Box SOP Class	yes	yes
Basic Print Image Overlay Box SOP Class - Retired	yes	yes
Basic Structured Display Storage	yes	yes
Basic Study Content Notification SOP Class - Retired	yes	yes
Basic Text SR Storage	yes	yes

SOP Classes	User	Provider
Basic Voice Audio Waveform Storage	yes	yes
Blending Softcopy Presentation State Storage SOP Class	yes	yes
Breast Tomosynthesis Image Storage	yes	yes
Cardiac Electrophysiology Waveform Storage	yes	yes
Colon CAD SR Storage	yes	yes
Color Softcopy Presentation State Storage SOP Class	yes	yes
Comprehensive SR Storage	yes	yes
Comprehensive SR Storage Trial Retired	yes	yes
Computed Radiography Image Storage	yes	yes
CT Image Storage	yes	yes
Deformable Spatial Registration Storage	yes	yes
Detail SR Storage Trial Retired	yes	yes
DICOS CT Image Storage	yes	yes
DICOS Digital XRay Image Storage For Presentation	yes	yes
DICOS Digital XRay Image Storage For Processing	yes	yes
DICOS Threat Detection Report Storage	yes	yes
Digital Intra Oral XRay Image Storage For Presentation	yes	yes
Digital Intra Oral XRay Image Storage For Processing	yes	yes
Digital Mammography XRay Image Storage For Presentation	yes	yes
Digital Mammography XRay Image Storage For Processing	yes	yes
Digital XRay Image Storage For Presentation	yes	yes
Digital XRay Image Storage For Processing	yes	yes
Eddy Current Image Storage	yes	yes
Eddy Current Multi Frame Image Storage	yes	yes
Encapsulated CDA Storage	yes	yes
Encapsulated PDF Storage	yes	yes
Enhanced CT Image Storage	yes	yes
Enhanced MR Color Image Storage	yes	yes
Enhanced MR Image Storage	yes	yes
Enhanced PET Image Storage	yes	yes
Enhanced SR Storage	yes	yes
Enhanced US Volume Storage	yes	yes
Enhanced XA Image Storage	yes	yes
Enhanced XRF Image Storage	yes	yes
General Audio Waveform Storage	yes	yes
General ECG Waveform Storage	yes	yes

SOP Classes	User	Provider
Grayscale Softcopy Presentation State Storage SOP Class	yes	yes
Hanging Protocol Storage	yes	yes
Hardcopy ColorImage Storage SOP Class - Retired	yes	yes
Hardcopy Grayscale Image Storage SOP Class - Retired	yes	yes
Hemodynamic Waveform Storage	yes	yes
Chest CAD SR Storage	yes	yes
Image Overlay Box SOP Class - Retired	yes	yes
Implantation Plan SR Storage	yes	yes
Intraocular Lens Calculations Storage	yes	yes
Intravascular Optical Coherence Tomography Image Storage For Presentation	yes	yes
Intravascular Optical Coherence Tomography Image Storage For Processing	yes	yes
Keratometry Measurements Storage	yes	yes
Key Object Selection Document Storage	yes	yes
Lensometry Measurements Storage	yes	yes
Macular Grid Thickness And Volume Report Storage	yes	yes
Mammography CAD SR Storage	yes	yes
MR Image Storage	yes	yes
MR Spectroscopy Storage	yes	yes
Multi Frame Grayscale Byte Secondary Capture Image Storage	yes	yes
Multi Frame Grayscale Word Secondary Capture Image Storage	yes	yes
Multi Frame Single Bit Secondary Capture Image Storage	yes	yes
Multi Frame TrueColor Secondary Capture Image Storage	yes	yes
Nuclear Medicine Image Storage	yes	yes
Nuclear Medicine Image Storage - Retired	yes	yes
Ophthalmic Axial Measurements Storage	yes	yes
Ophthalmic Photography 16Bit Image Storage	yes	yes
Ophthalmic Photography 8Bit Image Storage	yes	yes
Ophthalmic Tomography Image Storage	yes	yes
Ophthalmic Visual Field Static Perimetry Measurements Storage	yes	yes
MR Examcard Storage (PHILIPS private)	yes	yes
MR Series Data Storage (PHILIPS private)	yes	yes
MR Spectrum Storage (PHILIPS private)	yes	yes
Philips Private 3D Presentation State (PHILIPS private)	yes	yes
Positron Emission Tomography Image Storage	yes	yes
Presentation LUT SOP Class	yes	yes
Print Queue Management SOP Class Retired	yes	yes

SOP Classes	User	Provider
Procedure Log Storage	yes	yes
Pseudo Color Softcopy Presentation State Storage SOP Class	yes	yes
Raw Data Storage	yes	yes
Real World Value Mapping Storage	yes	yes
Referenced Image Box SOP Class - Retired	yes	yes
Respiratory Waveform Storage	yes	yes
RT Beams Treatment Record Storage	yes	yes
RT Brachy Treatment Record Storage	yes	yes
RT Dose Storage	yes	yes
RT Image Storage	yes	yes
RT Ion Beams Treatment Record Storage	yes	yes
RT Ion Plan Storage	yes	yes
RT Plan Storage	yes	yes
RT Structure Set Storage	yes	yes
RT Treatment Summary Record Storage	yes	yes
Secondary Capture Image Storage	yes	yes
Segmentation Storage	yes	yes
CSA Non Image Storage (Siemens private)	yes	yes
Spatial Fiducials Storage	yes	yes
Spatial Registration Storage	yes	yes
Spectacle Prescription Report Storage	yes	yes
Standalone Curve Storage - Retired	yes	yes
Standalone Modality LUT Storage - Retired	yes	yes
Standalone Overlay Storage - Retired	yes	yes
Standalone PET Curve Storage - Retired	yes	yes
Standalone VOILUT Storage - Retired	yes	yes
Stereometric Relationship Storage	yes	yes
Stored Print Storage SOP Class - Retired	yes	yes
Subjective Refraction Measurements Storage	yes	yes
Surface Segmentation Storage	yes	yes
Text SR Storage Trial - Retired	yes	yes
Twelve Lead ECG Wave form Storage	yes	yes
Ultrasound Image Storage	yes	yes
Ultrasound Image Storage - Retired	yes	yes
Ultrasound Multiframe Image Storage	yes	yes
Ultrasound Multiframe Image Storage - Retired	yes	yes

SOP Classes	User	Provider
US Private Data Storage (Toshiba private)	yes	yes
Video Endoscopic Image Storage	yes	yes
Video Microscopic Image Storage	yes	yes
Video Photographic Image Storage	yes	yes
Visual Acuity Measurements Storage	yes	yes
VL Endoscopic Image Storage	yes	yes
VL Image Storage - Retired	yes	yes
VL Microscopic Image Storage	yes	yes
VL Multiframe Image Storage - Retired	yes	yes
VL Photographic Image Storage	yes	yes
VL Slide Coordinates Microscopic Image Storage	yes	yes
VL Whole Slide Microscopy Image Storage	yes	yes
VOILUT Box SOP Class	yes	yes
Waveform Storage Trial - Retired	yes	yes
XA/XRF Grayscale Softcopy Presentation State Storage	yes	yes
X-Ray Angiographic BiPlane Image Storage - Retired	yes	yes
X-Ray Angiographic Image Storage	yes	yes
X-Ray Radiation Dose SR Storage	yes	yes
X-Ray Radiofluoroscopic Image Storage	yes	yes
X-Ray 3D Angiographic Image Storage	yes	yes
X-Ray 3D Craniofacial Image Storage	yes	yes

1.1.2 Query/Retrieve

Table 2: Query/Retrieve

SOP Classes	User	Provider
Patient Root Query/Retrieve Information Model - FIND	yes	yes
Patient Root Query/Retrieve Information Model - MOVE	yes	yes
Patient Root Query/Retrieve Information Model - GET	no	yes
Study Root Query/Retrieve Information Model - FIND	yes	yes
Study Root Query/Retrieve Information Model - MOVE	yes	yes
Study Root Query/Retrieve Information Model - GET	no	yes

1.1.3 Workflow Management

Table 3: Workflow Management

SOP Classes	User	Provider
Modality Performed Procedure Step	no	yes
Modality Worklist Information Model - FIND	yes	yes

1.1.4 Print Management

Table 4: Print Management

SOP Classes	User	Provider
Basic Grayscale Print Management Meta SOP Class	yes	no
Basic Color Print Management Meta SOP Class	yes	no
Basic Film Session SOP Class	yes	no
Basic Film Box SOP Class	yes	no
Basic Grayscale Image Box SOP Class	yes	no
Basic Color Image Box SOP Class	yes	no

2 Introduction

2.1 Revision History

Table 5: Revision History

Version	Date of Issue	Description
1.5	2020-10-27	Added support for Modality Performed Procedure Step SCP
1.4	2020-05-04	Added support for Private Philips 3D Presentation State Storage SOPClass (1.3.46.670589.2.5.1.1)
1.3	2020-04-15	Secure Transport Connection Profile
1.2	2019-12-10	Fixed various typos
1.1	2019-04-16	Added missing Real-Word activities
1.0	2018-10-03	Initial Draft

2.2 Audience

This document is written for the people that need to understand how *Dicompass Gateway* will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any

reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

2.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between *Dicompass Gateway* and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability. The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality. This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

2.4 Terms and Definition

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.

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, Computed Radiography Image Storage SOP Class.

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. A single device may have multiple Application Entities.

Application Entity Title (AET)

The externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.

Application Context

The specification of the type of communication used between Application Entities. Example: DICOM network protocol.

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).

DPGW

DPGW refers to *Dicompass Gateway*

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.

Joint Photographic Experts Group (JPEG)

A set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile

The specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

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.

MPPS

Modality Performed Procedure Step

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.

Security Profile

A set of mechanisms, such as encryption, user authentication, or digital signatures, used by an Application Entity to ensure confidentiality, integrity, and/or availability of exchanged DICOM data.

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 Class (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 Instance (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.

3 Networking

3.1 Implementation Model

The core component of DPGW is a Java Application, which provides DICOM services over the DICOM Upper Layer protocol (DUL), HL7 v2 services over the Minimal Lower Layer Protocol (MLLP), various proprietary RESTful services and a Web UI accessible by HTML 5 compliant web browsers. It uses PostgreSQL relational database for supporting query and data management backend. The received DICOM objects are not stored in the database, but in a separated storage backend - typically any type of file system, but also cloud storages (MS Azure Blob Storage, Amazon S3 storage) are supported.

3.1.1 Application Data Flow

Conceptually the network services may be modeled as the following separate AEs. They may have multiple instances identified by different AE Titles, with different configuration.

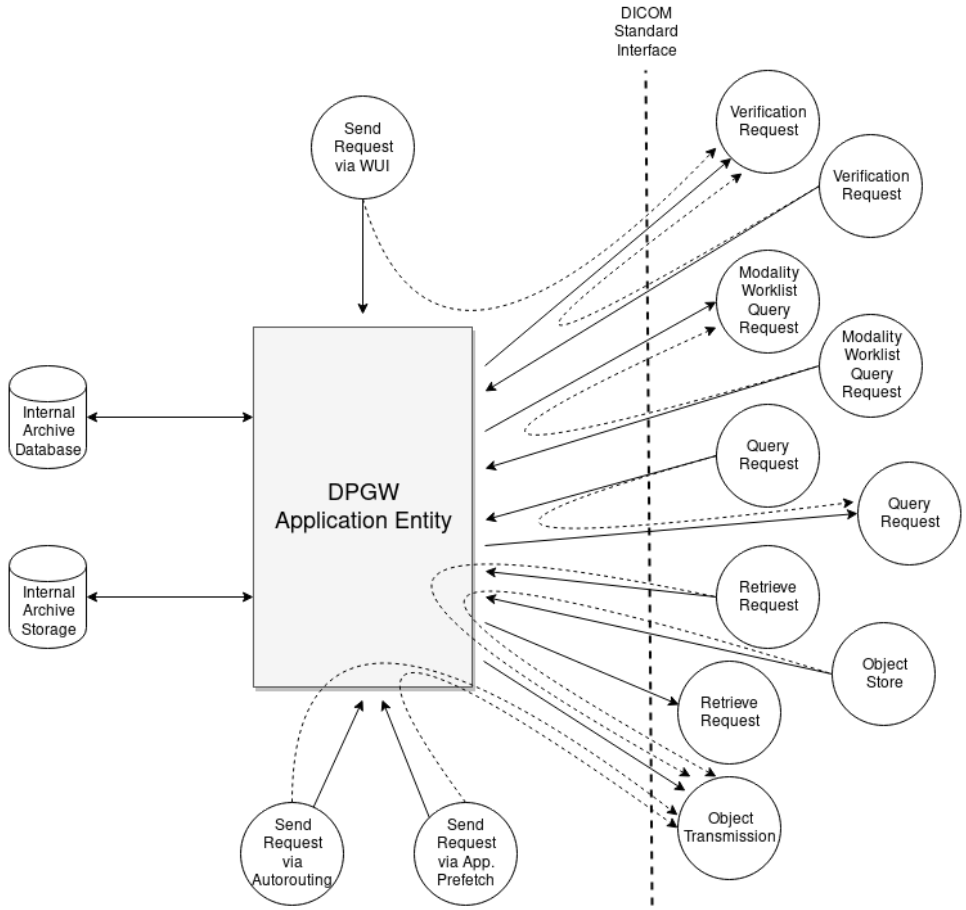

Figure 1: DPGW Data Flow

3.1.1.1 DPGW Application Entity DPGW Application Entity:

- Receives and stores incoming images and other Composite Object Instances.
- Processes queries for Patient, Study, Series and Instance information and it also processes retrieval requests, sending the requested objects to the retrieve destination AE.
- Provides modality worklist service based on HL7 messages received from a HIS/RIS.
- Receives and stores incoming MPPS Object Instances.
- WUI User can invoke:
  - Query request to other applications entities
  - Modality Worklist request to other applications entities
  - Verification request to other applications entities
- DICOM object transfer to other applications entities can be invoked by internal DPGW services:
  - Application Prefetching - transfer objects to other application entities based on rules for HL7 messages received from a HIS/RIS
  - Autorouting - transfer objects to other application entities based on internal configurable rules
- If configured, DPGW Application Entity can act as a DICOM proxy. Incoming DICOM request is transformed and forwarded to other applications entities.

Supported proxy DICOM operations:

- Verification request
- Query request
- Retrieve request
- Store request
- MWL Query request

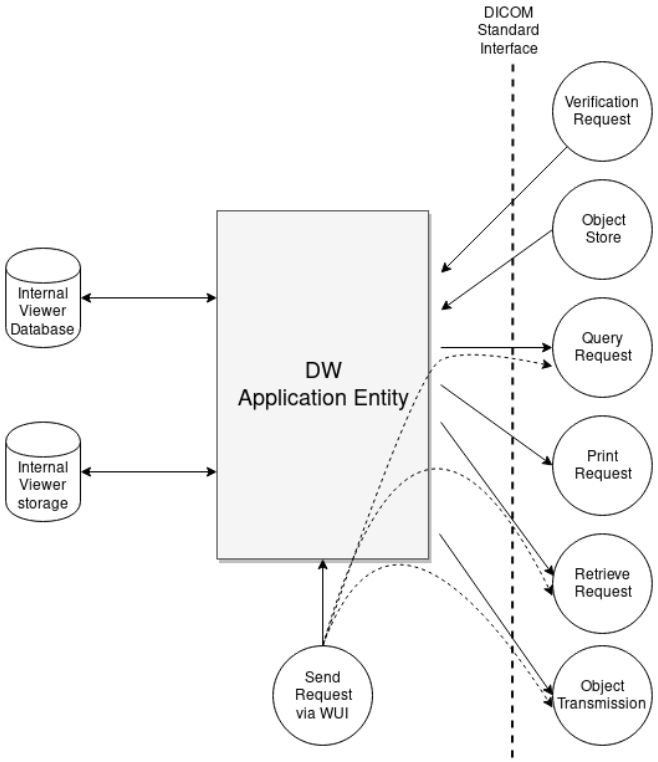

Figure 2: DW Data Flow

3.1.1.2 DW Application Entity DW Application Entity:

- Receives and stores incoming images and other Composite Object Instances.
- WUI User can invoke:
  - DICOM object transmission to other applications entities
  - Query request to other applications entities
  - Retrieve request to other applications entities
  - Verification request to other applications entities
  - Printing on DICOM printer request

3.1.2 Functional Definitions of AEs

3.1.2.1 DPGW Application Entity DPGW Application Entity implements:

Storage Service Classes

As a **SCP** it stores images and other Composite Object instances from remote AEs to local archive database. Compressed images and non-image objects are stored as received on the storage. Uncompressed images may be compressed according to configurable compression rules before they are stored with all attributes to the storage. A selected subset of attributes is extracted from the received objects and stored in the database. These attributes are coerced on receive time or by data management functions at any future time.

When an object is received, and its SOP Instance UID matches with the SOP Instance UID of a previously received object:

- Attributes stored in local database are supplemented with attributes from the newly received object, if they are not included in the existing record
- The previously received Composite Object stored in local repository is not changed or replaced

DPGW Application Entity can also be configured to act as a cache archive, which deletes the oldest studies according to the configured thresholds of the storage backend.

Received objects can be automatically forwarded to another AE by rules, which are triggered by matching sending/receiving AE Titles and/or matching object attribute values.

As a **SCU** it sends stored Composite Objects to remote application entities. The request can be invoked from DICOM retrieve request or as a DICOM proxy request triggered by the original Store request to DPGW Application Entity

Query/Retrieve Service Classes

As a **SCP** it processes queries for Patient, Study, Series and Instance information of received DICOM objects invoked by remote AEs. Attributes of requested entities are fetched from the database. The objects on the storage backend are not accessed. Therefore, only the configurable subset of attributes which were extracted from the received objects and stored in the database is provided.

DPGW Application Entity provides the ability to retrieve/transfer received DICOM objects to remote AEs. The transfer may be originated by a retrieve request from the same AE or from another remote AE.

As a **SCU** it can query and retrieve data from remote AEs. The request can be invoked from WUI by a user or as a DICOM proxy request triggered by the origial Query/Retrieve request to DPGW Application Entity.

Modality Performed Procedure Step

As a **SCP** it stores N-Create and N-Set objects from remote AEs to local archive database.

When an object is received, and its SOP Instance UID matches with the SOP Instance UID of a previously received object, MPPS stored in local database is supplemented with attributes from the newly received object.

Workflow Management Service Classes

As a Modality Worklist **SCP** it answers queries from remote application entities. The response contains datasets from local database created from HL7 messages from HIS/RIS or datasets returned from another remote AE that was requested by MWL proxy command.

As a Modality Worklist **SCU** it can query remote application entities. The request can be invoked from WUI by a user or as a DICOM proxy request triggered by the origial Query/Retrieve request to DPGW Application Entity.

3.1.2.2 DW Application Entity

DW Application Entity implements:

Storage Service Classes

As a **SCP** it stores images and other Composite Object instances from remote AEs to local viewer database. Compressed images are decompressed and stored together with uncompressed images to storages in internal format that ensures fast display in the HTML

5 based DICOM viewer. A configurable subset of attributes is extracted from the received objects and stored in the viewer database. These attributes are used by internal viewer services.

On receive of an object SOP Instance UID of which matches with the SOP Instance UID of a previous received object:

- Attributes stored in local viewer database are supplemented with attributes from the newly received object, when they are not included in the existing record
- The previously received Composite Object stored in viewer repository in internal format is not changed or replaced

As a **SCU** it sends stored Composite Objects to remote application entities. The request can be invoked from WUI by a user.

Query/Retrieve Service Classes

Query/Rerieve **SCP** is not implemented for DW Application Entity.

As a **SCU** it can query and retrieve data from remote AEs. The request can be invoked from WUI by a user.

3.2 AE Specification

3.2.1 DPGW Application Entity

3.2.1.1 SOP Classes The DPGW Application Entity provides Standard Conformance to the following SOP Classes :

Table 6: Storage SOP Classes for DPGW Application entity

SOP Class Name	SOP Class UID	User	Provider
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	yes	yes
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	yes	yes
Audio SR Storage Trial Retired	1.2.840.10008.5.1.4.1.1.88.2	yes	yes
Autorefraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.2	yes	yes
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	yes	yes
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	yes	yes
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	yes	yes
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	yes	yes
Basic Print Image Overlay Box SOP Class - Retired	1.2.840.10008.5.1.1.24.1	yes	yes
Basic Structured Display Storage	1.2.840.10008.5.1.4.1.1.131	yes	yes
Basic Study Content Notification SOP Class - Retired	1.2.840.10008.1.9	yes	yes
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	yes	yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	yes	yes
Blending Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.4	yes	yes
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	yes	yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	yes	yes
Colon CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.69	yes	yes
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	yes	yes

SOP Class Name	SOP Class UID	User	Provider
Comprehensive SR Storage Trial Retired	1.2.840.10008.5.1.4.1.1.88.4	yes	yes
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	yes	yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	yes	yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	yes	yes
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3	yes	yes
Detail SR Storage Trial - Retired	1.2.840.10008.5.1.4.1.1.88.3	yes	yes
DICOS CT Image Storage	1.2.840.10008.5.1.4.1.1.501.1	yes	yes
DICOS Digital XRay Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.501.2.1	yes	yes
DICOS Digital XRay Image Storage For Processing	1.2.840.10008.5.1.4.1.1.501.2.2	yes	yes
DICOS Threat Detection Report Storage	1.2.840.10008.5.1.4.1.1.501.3	yes	yes
Digital Intra Oral XRay Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.3	yes	yes
Digital Intra Oral XRay Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	yes	yes
Digital Mammography XRay Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.2	yes	yes
Digital Mammography XRay Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	yes	yes
Digital XRay Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1	yes	yes
Digital XRay Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	yes	yes
Eddy Current Image Storage	1.2.840.10008.5.1.4.1.1.601.1	yes	yes
Eddy Current Multi Frame Image Storage	1.2.840.10008.5.1.4.1.1.601.2	yes	yes
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2	yes	yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	yes	yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	yes	yes
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	yes	yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	yes	yes
Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.130	yes	yes
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	yes	yes
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	yes	yes
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	yes	yes
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	yes	yes
General Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.2	yes	yes
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	yes	yes
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	yes	yes
Hanging Protocol Storage	1.2.840.10008.5.1.4.38.1	yes	yes
Hardcopy Color Image Storage SOP Class - Retired	1.2.840.10008.5.1.1.30	yes	yes
Hardcopy Grayscale Image Storage SOP Class - Retired	1.2.840.10008.5.1.1.29	yes	yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	yes	yes
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65	yes	yes

SOP Class Name	SOP Class UID	User	Provider
Image Overlay Box SOP ClassRetired	1.2.840.10008.5.1.1.24	yes	yes
Implantation Plan SR Storage	1.2.840.10008.5.1.4.1.1.88.70	yes	yes
Intraocular Lens Calculations Storage	1.2.840.10008.5.1.4.1.1.78.8	yes	yes
Intravascular Optical Coherence Tomography Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.14.1	yes	yes
Intravascular Optical Coherence Tomography Image Storage For Processing	1.2.840.10008.5.1.4.1.1.14.2	yes	yes
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	yes	yes
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	yes	yes
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	yes	yes
Macular Grid Thickness And Volume Report Storage	1.2.840.10008.5.1.4.1.1.79.1	yes	yes
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	yes	yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	yes	yes
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	yes	yes
Multi Frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	yes	yes
Multi Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	yes	yes
Multi Frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	yes	yes
Multi Frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	yes	yes
Nuclear Medicine Image Storage - Retired	1.2.840.10008.5.1.4.1.1.5	yes	yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	yes	yes
Ophthalmic Axia lMeasurements Storage	1.2.840.10008.5.1.4.1.1.78.7	yes	yes
Ophthalmic Photography 16Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	yes	yes
Ophthalmic Photography 8Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	yes	yes
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	yes	yes
Ophthalmic Visual Field Static Perimetry Measurements Storage	1.2.840.10008.5.1.4.1.1.80.1	yes	yes
PHILIPS Private 3D Presentation State	1.3.46.670589.2.5.1.1	yes	yes
PHILIPS Private MR Examcard Storage	1.3.46.670589.11.0.0.12.4	yes	yes
PHILIPS Private MR Series Data Storage	1.3.46.670589.11.0.0.12.2	yes	yes
PHILIPS Private MR Spectrum Storage	1.3.46.670589.11.0.0.12.1	yes	yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	yes	yes
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	yes	yes
Print Queue Management SOP Class - Retired	1.2.840.10008.5.1.1.26	yes	yes
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40	yes	yes
Pseudo Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.3	yes	yes
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	yes	yes
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	yes	yes

SOP Class Name	SOP Class UID	User	Provider
Referenced Image Box SOP Class - Retired	1.2.840.10008.5.1.1.4.2	yes	yes
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1	yes	yes
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	yes	yes
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	yes	yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	yes	yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	yes	yes
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	yes	yes
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	yes	yes
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	yes	yes
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	yes	yes
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	yes	yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	yes	yes
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	yes	yes
Siemens CSA Non Image Storage	1.3.12.2.1107.5.9.1	yes	yes
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	yes	yes
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	yes	yes
Spectacle Prescription Report Storage	1.2.840.10008.5.1.4.1.1.78.6	yes	yes
Standalone Curve Storage - Retired	1.2.840.10008.5.1.4.1.1.9	yes	yes
Standalone Modality LUT Storage - Retired	1.2.840.10008.5.1.4.1.1.10	yes	yes
Standalone Overlay Storage - Retired	1.2.840.10008.5.1.4.1.1.8	yes	yes
Standalone PET Curve Storage - Retired	1.2.840.10008.5.1.4.1.1.129	yes	yes
Standalone VOILUT Storage - Retired	1.2.840.10008.5.1.4.1.1.11	yes	yes
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	yes	yes
Stored Print Storage SOP Class - Retired	1.2.840.10008.5.1.1.27	yes	yes
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4	yes	yes
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	yes	yes
Text SR Storage Trial - Retired	1.2.840.10008.5.1.4.1.1.88.1	yes	yes
Twelve Lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	yes	yes
Toshiba US Private Data Storage	1.2.392.200036.9116.7.8.1.1.1	yes	yes
Ultrasound Image Storage - Retired	1.2.840.10008.5.1.4.1.1.6	yes	yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	yes	yes
Ultrasound Multiframe Image Storage - Retired	1.2.840.10008.5.1.4.1.1.3	yes	yes
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	yes	yes
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	yes	yes
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	yes	yes
Video PhotographicImage Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	yes	yes

SOP Class Name	SOP Class UID	User	Provider
Visual Acuity Measurements Storage	1.2.840.10008.5.1.4.1.1.78.5	yes	yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	yes	yes
VL Image Storage - Retired	1.2.840.10008.5.1.4.1.1.77.1	yes	yes
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	yes	yes
VL Multiframe Image Storage - Retired	1.2.840.10008.5.1.4.1.1.77.2	yes	yes
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	yes	yes
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	yes	yes
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	yes	yes
VOILUT Box SOP Class	1.2.840.10008.5.1.1.22	yes	yes
Waveform Storage Trial - Retired	1.2.840.10008.5.1.4.1.1.9.1	yes	yes
XA/XRF Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.5	yes	yes
X-Ray Angiographic BiPlane Image Storage - Retired	1.2.840.10008.5.1.4.1.1.12.3	yes	yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	yes	yes
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	yes	yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	yes	yes
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	yes	yes
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	yes	yes

Table 7: Query/Retrieve SOP Classes for DPGW Application Entity

SOP Class Name	SOP Class UID	User	Provider
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	yes	yes
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	yes	yes
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	yes	yes
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	yes	yes

Table 8: Workflow management SOP Classes for DPGW Application Entity

SOP Class Name	SOP Class UID	User	Provider
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	no	yes
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	yes	yes

Table 9: Verification SOP Classes for DPGW Application Entity

SOP Class Name	SOP Class UID	User	Provider
Verification	1.2.840.10008.1.1	yes	yes

3.2.1.2 Association Policies The DPGW Application Entity can both accept and propose Association Requests. The DPGW Application Entity accepts Association Requests for the Verification, Storage, Query/Retrieve and Modality Worklist Services. It proposes Associations for the Verification, Storage, Query/Retrieve and Modality Worklist Services.

SOP Class extended negotiation is not supported.

Max PDU size offered and accepted is 16384.

The DICOM standard Application Context Name for DICOM 3.0 is always accepted and proposed:

Table 10: DICOM Application Context for DPGW Application Entity

	UID
Application Context Name	1.2.840.10008.3.1.1.1

3.2.1.2.1 Number Of Associations The DPGW Application Entity can support multiple simultaneous Associations requested by peer AEs. The maximum total number of simultaneous Associations is not limited.

DPGW Application Entity spawns a new thread for each connection request from remote AE or for every outgoing Association (Verification, Storage, Query/Retrieve and Modality Worklist Services). Therefore, DPGW can have multiple simultaneous connections, and there are no inherent limitations on the number of simultaneous associations.

3.2.1.2.2 Asynchronous Nature Asynchronous communication is not supported.

3.2.1.2.3 Implementation of Identifying Information The implementation information for the DPGW Application Entity is:

Table 11: DICOM Implementation Class and Version for DPGW Application Entity

Key	Value
Implementation Class UID	1.2.826.0.1.3680043.8.1053.6
Implementation Version Name	dpgw-A.BB.CC-REL

where A.BB.CC is the release number of DPGW.

3.2.1.2.4 Association Initiation Policies DPGW Application Entity initiates the association:

- To send composite instances
  - sub-operation of retrieve request from remote application entity

  - result of internal services (prefetch, autorouting) to transfer objects to another application entity

- To query/retrieve a remote application entity
  - query/retrieve proxy request to remote application entity as a reaction to the query/retrieve request from another remote application entity
  - query/retrieve proxy request to remote application entity as a reaction to the retrieve request from another remote application entity to collect information about instances stored in remote application entities
- To send verification requests
  - WUI user action to verify remote application entity
  - result of internal service to verify remote application entity
  - Verification proxy request to remote application entity as a reaction to the Verification request from another remote application entity
- To send Modality Worklist requests
  - WUI user action to display worklist items
  - Modality Worklist proxy request to remote application entity as a reaction to the Modality Worklist request from another remote application entity

Real-word activity - sub-operation of Retrieve request, Prefetch or Autorouting service instruction

Sequencing of Activities

1. DPGW Application Entity builds a list of SOP Instance UIDs to send
2. Collects Abstract and Transfer syntaxes of those SOP Instances
3. Initiates an Association to a destination Application Entity
4. Sends SOP Instances to a destination using C-Store
5. If triggered by C-Move request, DPGW notifies C-Move requester about C-Store status for every C-Store notification
6. Closes the Association

Proposed Presentation Contexts

For each Abstract Syntax, DPGW Application Entity proposes one or two Presentation Contexts:

- one Presentation Context (Abstract Syntax, Implicit VR Little Endian Transfer Syntax) for SOP Instances stored locally in Implicit VR Little Endian Transfer Syntax
- two Presentation Contexts (Abstract Syntax, Implicit VR Little Endian Transfer Syntax) and (Abstract Syntax, all other Transfer Syntaxes collected for that Abstract Syntax) for SOP Instances stored locally not in Implicit VR Little Endian Transfer Syntax

The set of the proposed Abstract Syntaxes is a minimal subset of supported Abstract Syntaxes needed to transfer of all SOP Instances to be sent.

Table 12: Transfer Syntaxes for Storage SOP Classes

Transfer Syntax Name	Transfer Syntax UID
Implicit VR Little Endian	1.2.840.10008.1.2

Transfer Syntax Name	Transfer Syntax UID
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2
Deflated Explicit VR Little Endian	1.2.840.10008.1.2.1.99
RLE Lossless	1.2.840.10008.1.2.5
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51
JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70
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
JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100
MPEG2 Main Profile @ High Level	1.2.840.10008.1.2.4.101
MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102
MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103

Table 13: Proposed Presentation Contexts by the DPGW Application Entity

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Storage SOP Class Name in table Storage SOP Classes for DPGW Application Entity	Storage SOP Class UID in table Storage SOP Classes for DPGW Application Entity	Transfer Syntax in table Transfer Syntaxes for Storage SOP Classes for DPGW Application Entity	SCU	None

SOP Specific Conformance for SOP Classes

Warnings or Errors in the C-Store response from the SCP are ignored and DPGW Application Entity will continue to send SOP Instances. In case of error (network timeout, TCP/IP error, ...) DPGW Application Entity will abort the Association with an A-ABORT.

DPGW Application Entity modifies patient/study/series attributes in the SOP Instances being sent with the current metadata from internal database. Updated attributes are listed in the following table:

Table 14: Attributes updated in SOP Instance

Attribute Name	Tag Number
Study Date	(0008,0020)
Series Date	(0008,0021)

Attribute Name	Tag Number
Study Time	(0008,0030)
Series Time	(0008,0031)
Accession Number	(0008,0050)
Referring Physician Name	(0008,0090)
Study Description	(0008,1030)
Requesting Physician	(0008,1032)
Series Description	(0008,103E)
Performing Physician's Name	(0008,1050)
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Issuer of Patient ID	(0010,0021)
Patient's Birth Date	(0010,0030)
Patient's Birth Time	(0010,0032)
Patient's Sex	(0010,0040)
Other Patient IDs Sequence	(0010,1002)
Patient's Age	(0010,1010)
Patient Size	(0010,1020)
Patient Weight	(0010,1030)
Study ID	(0020,0010)
Requesting Physician	(0032,1032)

Real-word activity - C-Find Proxy instruction to query remote Application Entity

Sequencing of Activities

DPGW Application Entity:

1. Accepts an association from source AE
2. Initiates an Association to query remote AE
3. Receives C-Find request from source AE
4. Sends C-Find request to remote AE
5. Receives C-Find responses from remote AE and sends responses to the source AE
6. Closes the Association to remote AE

Proposed Presentation Contexts

DPGW Application Entity proposes to the remote AE the same Presentation Contexts as received in Association from source AE.

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance. The keys from source C-Find request are copied to remote C-Find request and can be modified by configuration scripts. Depending on configuration, DPGW AE is able to modify or filter response data, before sending it to source AE.

Real-word activity - C-Move Proxy instruction to retrieve data from remote Application Entity

Sequencing of Activities

DPGW Application Entity:

1. Accepts an association from source AE
2. Initiates an Association to query remote AE
3. Receives C-Move request from source AE
4. Sends C-Move request to remote AE
5. Receives C-Move responses from remote AE and sends responses to the source AE
6. Closes the Association to remote AE

Proposed Presentation Contexts

DPGW Application Entity proposes to the remote AE the same Presentation Contexts as received in Association from source AE.

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance. The keys from source C-Move request are copied to remote C-Move request and can be modified by configuration scripts.

Real-word activity - WUI user instruction to query remote Application Entity for worklist records (MWL C-Find)

Sequencing of Activities

DPGW Application Entity:

1. Initiates an Association to query remote AE
2. Sends MWL C-Find request to remote AE
3. Receives MWL C-Find responses from remote AE
4. Closes the Association to remote AE

Proposed Presentation Contexts

Table 15: Proposed Presentation Contexts MWL C-Find

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian 1.2.840.10008.1.2	SCU	None

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

Used keys in query:

Table 16: MWL C-Find requested keys

Attribute name	Tag
Accession Number	(0008,0050)
Referring Physician's Name	(0008,0090)
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)
Patient's Birth Time	(0010,0032)
Patient's Sex	(0010,0040)
Patient's Age	(0010,1010)
Patient's Size	(0010,1020)
Patient Weight	(0010,1030)
Study Instance UID	(0020,000D)
Requesting Physician	(0032,1032)
Requested Procedure Description	(0032,1060)
Scheduled Procedure Step Sequence	(0040,0100)
> Modality	(0008,0060)
> Scheduled Station AE Title	(0040,0001)
> Scheduled Procedure Step Start Date	(0040,0002)
> Scheduled Performing Physician's Name	(0040,0006)
> Scheduled Procedure Step Description	(0040,0007)
> Scheduled Procedure Step ID	(0040,0009)
Requested Procedure ID	(0040,1001)

Real-word activity - MWL C-Find Proxy instruction to query remote Application Entity

Sequencing of Activities

DPGW Application Entity:

1. Accepts an association from source AE
2. Initiates an Association to query remote AE
3. Receives MWL C-Find request from source AE
4. Sends MWL C-Find request to remote AE
5. Receives MWL C-Find responses from remote AE and sends responses to the source AE
6. Closes the Association to remote AE

Proposed Presentation Contexts

DPGW Application Entity proposes to the remote AE the same Presentation Contexts as received in Association from source AE.

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance. The keys from source MWL C-Find request are copied to remote C-Find request and can be modified by configuration scripts. Depending on configuration, DPGW AE is able to modify or filter response data, before sending it to source AE.

Real-word activity - C-Store Proxy instruction to store data to remote Application Entity

Sequencing of Activities

DPGW Application Entity:

1. Accepts an association from source AE
2. Initiates an Association to query remote AE
3. Receives C-Store command from source AE
4. Sends C-Store commands to remote AE
5. Receives C-Store response from remote AE and sends response to the source AE
6. Closes the Association to remote AE

Proposed Presentation Contexts

DPGW Application Entity proposes to the remote AE the same Presentation Contexts as received in Association from source AE.

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance. DICOM tags of the transferred SOPInstances can be modified by configuration scripts.

Real-word activity - C-Echo Proxy instruction to verify remote Application Entity

Sequencing of Activities

DPGW Application Entity:

1. Receives an association request from source AE
2. Initiates an Association to verify remote AE
3. Sends C-Echo command to remote AE
4. Receives C-Echo response from remote AE
5. If success, accepts an association from source AE, otherwise DPGW AE refuses source association
6. Receives C-Echo command from source AE
7. Sends C-Echo response to remote AE
8. Closes the Association to remote AE

Proposed Presentation Contexts

DPGW Application Entity proposes to the remote AE the same Presentation Contexts as received in Association from source AE.

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

Real-word activity - WUI User or internal service instruction to verify remote Application Entity

Sequencing of Activities

DPGW Application Entity:

1. Initiates an Association to verify remote AE
2. Sends C-Echo command to remote AE
3. Receives C-Echo response from remote AE
4. Closes the Association to remote AE

Proposed Presentation Contexts

Table 17: Proposed Presentation Context

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Verification	1.2.840.10008.1.1	Implicit VR Little Endian 1.2.840.10008.1.2	SCU	None

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

3.2.1.2.5 Association Acceptance Policy DPGW Application Entity accepts associations from Application Entities registered in internal database. DPGW Application Entity accepts associations:

- to verify communication
- to query composite instances stored in internal database
- to query composite instances stored in other remote Application Entities (proxy)
- to retrieve SOP Instances stored in internal database
- to retrieve SOP Instances stored in other remote Application Entities (proxy)
- to store SOP Instances to the internal database
- to store SOP Instances to other remote Application Entities (proxy)
- to obtain Modality Worklist from internal database
- to obtain Modality Worklist from other remote Application Entities (proxy)
- to N-Create or N-Set MPPS

Real-word activity - communication verification request (C-Echo)

Sequencing of Activities

The DPGW Application Entity accepts an association from remote AE to verify communication.

Accepted Presentation Contexts

Table 18: Accepted Presentation Context (C-Echo)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Verification	1.2.840.10008.1.1	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

Real-word activity - Internal database Query request (C-Find)

Sequencing of Activities

DPGW Application Entity accepts an association from remote AE to query SOP Instances stored in internal database.

Accepted Presentation Contexts

Table 19: Accepted Presentation Contexts (C-Find)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Explicit VR Little Endian 1.2.840.10008.1.2.1	SCP	None
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None
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	SCP	None

DPGW Application Entity selects the first supported Transfer Syntax from the list of proposed Transfer Syntaxes in Presentation Context.

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

Case sensitive/insensitive and diacritics sensitive/insensitive matching is configurable.

DPGW Application Entity limits the number of returned responses. The limit can be configured per level (PATIENT, STUDY, SERIES, IMAGE).

DPGW Application Entity supports matching and returning following keys:

Table 20: Patient Root Information Model

Level	Attribute name	Tag	Matching	Returned
PATIENT	Patient's Name	(0010,0010)	yes	yes
PATIENT	Patient ID	(0010,0020)	yes	yes
PATIENT	Patient's Birth Date	(0010,0030)	yes	yes
PATIENT	Patient's Birth Time	(0010,0032)	yes	yes
PATIENT	Patient's Sex	(0010,0040)	yes	yes
PATIENT	Number of Patient Related Studies	(0020,1200)	no	yes
STUDY	Study Date	(0008,0020)	yes	yes
STUDY	Study Time	(0008,0030)	yes	yes
STUDY	Accession Number	(0008,0050)	yes	yes
STUDY	Modalities in Study	(0008,0061)	yes	yes
STUDY	Institution Name	(0008,0080)	yes	yes
STUDY	Referring Physician's Name	(0008,0090)	yes	yes
STUDY	Study Description	(0008,1030)	yes	yes
STUDY	Study Instance UID	(0020,000D)	yes	yes
STUDY	Study ID	(0020,0010)	yes	yes
STUDY	Number of Study Related Series	(0020,1206)	no	yes
STUDY	Number of Study Related Instances	(0020,1208)	no	yes
SERIES	Series Date	(0008,0021)	no	yes
SERIES	Series Time	(0008,0031)	no	yes
SERIES	Modality	(0008,0060)	yes	yes
SERIES	Series Description	(0008,103E)	yes	yes
SERIES	Body Part Examined	(0018,0015)	no	yes
SERIES	Performing Physician's Name	(0008,1050)	no	yes
SERIES	Patient Position	(0018,5100)	no	yes
SERIES	Series Instance UID	(0020,000E)	yes	yes
SERIES	Series Number	(0020,0011)	yes	yes
SERIES	Number of Series Related Instances	(0020,1209)	no	yes
SERIES	Performed Station AETitle	(0040,0241)	yes	yes
IMAGE	Transfer Syntax UID	(0002,0010)	no	yes
IMAGE	Image Type	(0008,0008)	no	yes
IMAGE	SOP Class UID	(0008,0016)	yes	yes
IMAGE	SOP Instance UID	(0008,0018)	yes	yes
IMAGE	Instance Number	(0020,0013)	yes	yes

Level	Attribute name	Tag	Matching	Returned
IMAGE	Number Of Frames	(0028,0008)	no	yes

Table 21: Study Root Information Model

Level	Attribute name	Tag	Matching	Returned
STUDY	Study Date	(0008,0020)	yes	yes
STUDY	Study Time	(0008,0030)	yes	yes
STUDY	Accession Number	(0008,0050)	yes	yes
STUDY	Modalities in Study	(0008,0061)	yes	yes
STUDY	Institution Name	(0008,0080)	yes	yes
STUDY	Referring Physician's Name	(0008,0090)	yes	yes
STUDY	Study Description	(0008,1030)	yes	yes
STUDY	Study Instance UID	(0020,000D)	yes	yes
STUDY	Study ID	(0020,0010)	yes	yes
STUDY	Number of Study Related Series	(0020,1206)	no	yes
STUDY	Number of Study Related Instances	(0020,1208)	no	yes
SERIES	Series Date	(0008,0021)	no	yes
SERIES	Series Time	(0008,0031)	no	yes
SERIES	Modality	(0008,0060)	yes	yes
SERIES	Series Description	(0008,103E)	yes	yes
SERIES	Body Part Examined	(0018,0015)	no	yes
SERIES	Performing Physician's Name	(0008,1050)	no	yes
SERIES	Patient Position	(0018,5100)	no	yes
SERIES	Series Instance UID	(0020,000E)	yes	yes
SERIES	Series Number	(0020,0011)	yes	yes
SERIES	Number of Series Related Instances	(0020,1209)	no	yes
SERIES	Performed Station AETitle	(0040,0241)	yes	yes
IMAGE	Transfer Syntax UID	(0002,0010)	no	yes
IMAGE	Image Type	(0008,0008)	no	yes
IMAGE	SOP Class UID	(0008,0016)	yes	yes
IMAGE	SOP Instance UID	(0008,0018)	yes	yes
IMAGE	Instance Number	(0020,0013)	yes	yes
IMAGE	Number Of Frames	(0028,0008)	no	yes

Status codes returned to the source application entity:

Table 22: C-FIND Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	Matching is complete. No final Identifier is supplied.
Refused	Out of Resources	A700	System reached the limit in disk space or memory usage. Error message is printed to the application log.
ResultLimitExceeded	Configured result limit exceeded	C001	Results would return more items than configured limit.
Cancel	Matching terminated due to Cancel request	FE00	The C-FIND SCU sent a Cancel Request. This has been acknowledged and the search for matches has been halted.
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported	FF00	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if all Optional keys in the query identifier are actually supported.
Pending - Warning	Matches are continuing - Warning that one or more Optional Keys were not supported	FF01	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if there are Optional keys in the query identifier that are not supported.

Real-word activity - Proxy Query request (C-Find)

DPGW Application Entity accepts an association from source AE and initiates an Association to one or more remote AEs. C-Find requests from source AE are forwarded to remote AEs. Responses from remote AEs are subsequently collected or filtered and then sent back to source AE. Keys in forwarded C-Find command can be modified by configuration scripts.

Sequencing of Activities

DPGW Application Entity:

1. Accepts an association from source AE
2. Initiates an Association to query remote AEs
3. Receives C-Find request from source AE
4. Sends C-Find request to remote AE
5. Receives C-Find responses from remote AEs and sends responses to the source AE
6. Closes the Association to remote AE

Accepted Presentation Contexts

Table 23: Accepted Presentation Contexts (C-Find)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Explicit VR Little Endian 1.2.840.10008.1.2.1	SCP	None
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None
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	SCP	None

DPGW Application Entity selects the first supported Transfer Syntax from the list of proposed Transfer Syntaxes in Presentation Context.

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

Status codes returned to the source application entity:

Table 24: C-FIND Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	Matching is complete. No final Identifier is supplied.
Refused	Out of Resources	A700	System reached the limit in disk space or memory usage. Error message is output to the application log.
ResultLimitExceeded	Configured result limit exceeded	C001	Results would return more items than configured limit.
PartialResultSomeArchiveNotAvailable	Some archive behind DICOM proxy not available. The result may be incomplete.	C002	Some archive behind DICOM proxy not available.
PartialResultLimitExceededFromSomeArchive	Some archive behind DICOM proxy returned “result limit exceeded” error. The result may be incomplete.	C003	Some archive behind DICOM proxy returned “result limit exceeded” error.

Service Status	Further Meaning	Error Code	Reason
PartialResultGetErrorFromSomeArchive	Some archive behind DICOM proxy returned error. The result may be incomplete.	C004	Some archive behind DICOM proxy returned error.
Cancel	Matching terminated due to Cancel request	FE00	The C-FIND SCU sent a Cancel Request. This has been acknowledged and the search for matches has been halted.
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported	FF00	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if all Optional keys in the query identifier are actually supported.

Real-word activity - Internal database Retrieve request (C-Move)

DPGW Application Entity accepts an association from source AE to retrieve SOP Instances stored in internal database by C-Move.

Sequencing of Activities

DPGW Application Entity:

1. Accepts an association from source AE
2. Receives C-Move request from source AE
3. Collects SOP Instances matching the request
4. Initiates an C-Store Association to destination AE
5. Sends SOP Instances to destination AE
6. Sends C-Move responses to source AE for every C-Store operation
7. Close Association to destination AE

Accepted Presentation Contexts

Table 25: Accepted Presentation Contexts (C-Move)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Explicit VR Little Endian 1.2.840.10008.1.2.1	SCP	None
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	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	SCP	None

DPGW Application Entity selects the first supported Transfer Syntax from the list of proposed Transfer Syntaxes in Presentation Context.

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

Case sensitive/insensitive and diacritics sensitive/insensitive matching is configurable.

DPGW Application Entity limits the number of returned responses. The limit can be configured per level (PATIENT, STUDY, SERIES, IMAGE).

DPGW Application Entity supports matching following keys:

Table 26: Patient Root Information Model

Level	Attribute name	Tag
PATIENT	Patient's Name	(0010,0010)
PATIENT	Patient ID	(0010,0020)
PATIENT	Patient's Birth Date	(0010,0030)
PATIENT	Patient's Birth Time	(0010,0032)
PATIENT	Patient's Sex	(0010,0040)
STUDY	Study Date	(0008,0020)
STUDY	Study Time	(0008,0030)
STUDY	Accession Number	(0008,0050)
STUDY	Modalities in Study	(0008,0061)
STUDY	Institution Name	(0008,0080)
STUDY	Referring Physician's Name	(0008,0090)

Level	Attribute name	Tag
STUDY	Study Description	(0008,1030)
STUDY	Study Instance UID	(0020,000D)
STUDY	Study ID	(0020,0010)
SERIES	Modality	(0008,0060)
SERIES	Series Description	(0008,103E)
SERIES	Series Instance UID	(0020,000E)
SERIES	Series Number	(0020,0011)
SERIES	Performed Station AETitle	(0040,0241)
IMAGE	SOP Class UID	(0008,0016)
IMAGE	SOP Instance UID	(0008,0018)
IMAGE	Instance Number	(0020,0013)

Table 27: Study Root Information Model

Level	Attribute name	Tag
STUDY	Study Date	(0008,0020)
STUDY	Study Time	(0008,0030)
STUDY	Accession Number	(0008,0050)
STUDY	Modalities in Study	(0008,0061)
STUDY	Institution Name	(0008,0080)
STUDY	Referring Physician’s Name	(0008,0090)
STUDY	Study Description	(0008,1030)
STUDY	Study Instance UID	(0020,000D)
STUDY	Study ID	(0020,0010)
SERIES	Modality	(0008,0060)
SERIES	Series Description	(0008,103E)
SERIES	Series Instance UID	(0020,000E)
SERIES	Series Number	(0020,0011)
SERIES	Performed Station AETitle	(0040,0241)
IMAGE	SOP Class UID	(0008,0016)
IMAGE	SOP Instance UID	(0008,0018)
IMAGE	Instance Number	(0020,0013)

Status codes returned to the source application entity:

Table 28: C-Move Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	Matching is complete. No final Identifier is supplied.
Refused	Out of Resources	A700	System reached the limit in disk space or memory usage. Error message is output to the application log.
ResultLimitExceeded	Configured result limit exceeded	C001	Results would return more items than configured limit.
Cancel	Matching terminated due to Cancel request	FE00	The C-Move SCU sent a Cancel Request. This has been acknowledged and the search for matches has been halted.
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported	FF00	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if all Optional keys in the query identifier are actually supported.
Pending - Warning	Matches are continuing - Warning that one or more Optional Keys were not supported	FF01	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if there are Optional keys in the query identifier that are not supported.

Real-word activity - Proxy Retrieve request (C-Move)

DPGW Application Entity accepts an association from source AE to retrieve SOP Instances stored in one or more remote AEs. C-Move requests from source AE are forwarded to remote AEs. Responses from remote AEs are collected and sent back to source AE. Keys in forwarded C-Move command can be modified by configuration scripts. SOP Instances stored from remote AEs are routed to destination AE.

Sequencing of Activities

DPGW Application Entity:

1. Accepts an association from source AE
2. Initiates an Association to remote AEs
3. Receives C-Move request from source AE
4. Forwards C-Move request to remote AEs
5. Retrieves and collects C-Move responses from remote AEs and sends them back to source AE
6. Accepts C-Store Associations from remote AEs
7. Initiates a C-Store Association to destination AE

8. Forwards C-Store commands from remote AEs to destination AE
9. Closes Association to destination AE
10. Closes Associations to remote AEs

Accepted Presentation Contexts

Table 29: Accepted Presentation Contexts (C-Move)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Explicit VR Little Endian 1.2.840.10008.1.2.1	SCP	None
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	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	SCP	None

DPGW Application Entity selects the first supported Transfer Syntax from the list of proposed Transfer Syntaxes in Presentation Context.

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

Status codes returned to the source application entity:

Table 30: C-Move Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	Matching is complete. No final Identifier is supplied.
Refused	Out of Resources	A700	System reached the limit in disk space or memory usage. Error message is output to the application log.
ResultLimitExceeded	Configured result limit exceeded	C001	Results would return more items than configured limit.
Cancel	Matching terminated due to Cancel request	FE00	The C-Move SCU sent a Cancel Request. This has been acknowledged and the search for matches has been halted.

Service Status	Further Meaning	Error Code	Reason
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported	FF00	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if all Optional keys in the query identifier are actually supported.

Real-word activity - Store data to internal database request (C-Store)

Sequencing of Activities

DPGW Application Entity accepts an association from remote AE to store SOP Instances to internal database using C-Store command.

Accepted Presentation Contexts

Table 31: Accepted Presentation Contexts (C-Store)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Storage SOP Class Name in table Storage SOP Classes for DPGW Application Entity	Storage SOP Class UID in table Storage SOP Classes for DPGW Application Entity	Transfer Syntax in table Transfer Syntaxes for Storage SOP Classes for DPGW Application Entity	SCP	None

DPGW Application Entity selects the first supported Transfer Syntax from the list of proposed Transfer Syntaxes in Presentation Context.

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

DPGW Application Entity in default configuration does not change or remove any Attributes. Stored Attributes are not validated if they meet the requirements of the IOD.

Status codes returned to the source application entity:

Table 32: C-Store Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The Composite SOP Instance was successfully received, verified, and stored in the system database.
Refused	Out of Resources	A700	Indicates that the instance is not valid/mismatches on identifiers or exhausted system resources . Error message is output to the application log. The SOP Instance will not be stored.

Real-word activity - Proxy store to remote AEs (C-Store)

C-Store commands are forwarded to one or more remote AEs. Responses from remote AEs are collected and sent back to source AE.

Sequencing of Activities

DPGW Application Entity:

1. Accepts an association from source AE to store SOP Instances
2. Initiates associations to remote AEs with the some Presentation Contexts accepted form source destination
3. Forwards C-Store commands from source AE to remote AEs
4. Sends back C-Store responses collected from remote AEs
5. Closes association to remote AEs

Accepted Presentation Contexts

Table 33: Accepted Presentation Contexts (C-Store)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Storage SOP Class Name in table Storage SOP Classes for DPGW Application Entity	Storage SOP Class UID in table Storage SOP Classes for DPGW Application Entity	Transfer Syntax in table Transfer Syntaxes for Storage SOP Classes for DPGW Application Entity	Transfer Syntax UID in table Transfer Syntaxes for Storage SOP Classes for DPGW Application Entity	SCP

DPGW Application Entity selects the first supported Transfer Syntax from the list of proposed Transfer Syntaxes in Presentation Context.

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

Status codes returned to the source application entity:

Table 34: C-Store Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The Composite SOP Instance was successfully stored on remote AEs.
Refused	Out of Resources	A700	Indicates that the instance was not correctly stored on remote AEs.

Real-word activity - Modality worklist request (MWL C-Find)

Sequencing of Activities

DPGW Application Entity accepts an association from remote AE to query internal database for MWL records.

Accepted Presentation Contexts

Table 35: Accepted Presentation Contexts (MWL C-Find)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

Case sensitive/insensitive and diacritics sensitive/insensitive matching is configurable.

DPGW Application Entity supports matching following keys:

Table 36: MWL C-Find supported keys

Attribute name	Tag	Matching	Returned
Accession Number	(0008,0050)	yes	yes
Referring Physician's Name	(0008,0090)	no	yes
Referenced Study Sequence	(0008,1110)		yes
Referenced Patient Sequence	(0008,1120)		yes
Patient's Name	(0010,0010)	yes	yes
Patient ID	(0010,0020)	yes	yes
Patient's Birth Date	(0010,0030)	yes	yes
Patient's Birth Time	(0010,0032)	yes	yes
Patient's Sex	(0010,0040)	yes	yes
Patient's Age	(0010,1010)	no	yes
Patient's Size	(0010,1020)	no	yes
Patient Weight	(0010,1030)	no	yes
Pregnancy Status	(0010,21C0)	no	yes
Medical Alerts	(0010,2000)	no	yes
Contrast Allergies	(0010,2110)	no	yes
Study Instance UID	(0020,000D)	no	yes
Requesting Physician	(0032,1032)	no	yes
Admission ID	(0032,0010)	no	yes
Requested Procedure Description	(0032,1060)	no	yes
Current Patient Location	(0038,0300)	no	yes
Patient State	(0038,0500)	no	yes
Scheduled Procedure Step Sequence	(0040,0100)		yes

Attribute name	Tag	Matching	Returned
> Modality	(0008,0060)	yes	yes
> Scheduled Station AE Title	(0040,0001)	yes	yes
> Scheduled Procedure Step Start Date	(0040,0002)	yes	yes
> Scheduled Procedure Step Start Time	(0040,0003)	yes	yes
> Scheduled Performing Physician's Name	(0040,0006)	no	yes
> Scheduled Procedure Step Description	(0040,0007)	no	yes
> Scheduled Procedure Step ID	(0040,0009)	no	yes
> Scheduled Procedure Step Location	(0040,0011)	no	yes
Requested Procedure ID	(0040,1001)	no	yes
Confidentiality constraint on patient data	(0040,3001)	no	yes

Status codes returned to the source application entity:

Table 37: MWL C-FIND Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	Matching is complete. No final Identifier is supplied.
Refused	Out of Resources	A700	System reached the limit in disk space or memory usage. Error message is output to the application log.
Cancel	Matching terminated due to Cancel request	FE00	The MWL C-FIND SCU sent a Cancel Request. This has been acknowledged and the search for matches has been halted.
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported	FF00	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if all Optional keys in the query identifier are actually supported.
Pending - Warning	Matches are continuing - Warning that one or more Optional Keys were not supported	FF01	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if there are Optional keys in the query identifier that are not supported.

Real-word activity - Modality Performed Procedure Step

Sequencing of Activities

DPGW Application Entity accepts an association from remote AE to process N-Create and N-Set commands and stores or supplements already stored MPPS attribute in local database.

Accepted Presentation Contexts

Table 38: Accepted Presentation Contexts (MPPS)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Explicit VR Little Endian 1.2.840.10008.1.2.1	SCP	None

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

Case sensitive/insensitive and diacritics sensitive/insensitive matching is configurable.

Status codes returned to the source application entity:

Table 39: MPPS Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	N-Set or N-Create command successfully completed.
Refused	Out of Resources	A700	System reached the limit in disk space or memory usage or internal application error. Error message is output to the application log.

Real-word activity - Proxy Modality worklist request (MWL C-Find)

DPGW Application Entity accepts an association from source AE and initiates an Association to remote AE. MWL C-Find requests from source AE are forwarded to remote AE. Responses from remote AE are subsequently collected or filtered and then sent back to source AE. Keys in forwarded MWL C-Find command can be modified by configuration scripts.

Sequencing of Activities

DPGW Application Entity:

1. Accepts an association from source AE
2. Initiates an Association to query remote AE
3. Receives MWL C-Find request from source AE
4. Sends MWL C-Find request to remote AE
5. Receives MWL C-Find responses from remote AE and sends responses to the source AE
6. Closes the Association to remote AE

Accepted Presentation Contexts

Table 40: Accepted Presentation Contexts (C-Find)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None

SOP Specific Conformance for SOP Classes

DPGW Application Entity provides standard conformance.

Status codes returned to the source application entity:

Table 41: Proxy MWL C-FIND Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	Matching is complete. No final Identifier is supplied.
Refused	Out of Resources	A700	System reached the limit in disk space or memory usage. Error message is output to the application log.
Cancel	Matching terminated due to Cancel request	FE00	The C-FIND SCU sent a Cancel Request. This has been acknowledged and the search for matches has been halted.
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported	FF00	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if all Optional keys in the query identifier are actually supported.

3.2.2 DW Application Entity

3.2.2.1 SOP Classes The DW Application Entity provides Standard Conformance to the following SOP Classes :

Table 42: Storage SOP Classes for DW Application entity

SOP Class Name	SOP Class UID	User	Provider
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	yes	yes
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	yes	yes
Audio SR Storage Trial Retired	1.2.840.10008.5.1.4.1.1.88.2	yes	yes
Autorefraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.2	yes	yes
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	yes	yes
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	yes	yes

SOP Class Name	SOP Class UID	User	Provider
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	yes	yes
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	yes	yes
Basic Print Image Overlay Box SOP Class - Retired	1.2.840.10008.5.1.1.24.1	yes	yes
Basic Structured Display Storage	1.2.840.10008.5.1.4.1.1.131	yes	yes
Basic Study Content Notification SOP Class - Retired	1.2.840.10008.1.9	yes	yes
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	yes	yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	yes	yes
Blending Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.4	yes	yes
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	yes	yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	yes	yes
Colon CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.69	yes	yes
Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.2	yes	yes
Comprehensive SR Storage Trial Retired	1.2.840.10008.5.1.4.1.1.88.4	yes	yes
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	yes	yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	yes	yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	yes	yes
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3	yes	yes
Detail SR Storage Trial - Retired	1.2.840.10008.5.1.4.1.1.88.3	yes	yes
DICOS CT Image Storage	1.2.840.10008.5.1.4.1.1.501.1	yes	yes
DICOS Digital XRay Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.501.2.1	yes	yes
DICOS Digital XRay Image Storage For Processing	1.2.840.10008.5.1.4.1.1.501.2.2	yes	yes
DICOS Threat Detection Report Storage	1.2.840.10008.5.1.4.1.1.501.3	yes	yes
Digital Intra Oral XRay Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.3	yes	yes
Digital Intra Oral XRay Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	yes	yes
Digital Mammography XRay Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.2	yes	yes
Digital Mammography XRay Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	yes	yes
Digital XRay Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.1.1	yes	yes
Digital XRay Image Storage For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	yes	yes
Eddy Current Image Storage	1.2.840.10008.5.1.4.1.1.601.1	yes	yes
Eddy Current Multi Frame Image Storage	1.2.840.10008.5.1.4.1.1.601.2	yes	yes
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2	yes	yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	yes	yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	yes	yes
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	yes	yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	yes	yes
Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.130	yes	yes

SOP Class Name	SOP Class UID	User	Provider
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	yes	yes
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	yes	yes
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	yes	yes
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	yes	yes
General Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.2	yes	yes
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	yes	yes
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1	yes	yes
Hanging Protocol Storage	1.2.840.10008.5.1.4.38.1	yes	yes
Hardcopy Color Image Storage SOP Class - Retired	1.2.840.10008.5.1.1.30	yes	yes
Hardcopy Grayscale Image Storage SOP Class - Retired	1.2.840.10008.5.1.1.29	yes	yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	yes	yes
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65	yes	yes
Image Overlay Box SOP ClassRetired	1.2.840.10008.5.1.1.24	yes	yes
Implantation Plan SR Storage	1.2.840.10008.5.1.4.1.1.88.70	yes	yes
Intraocular Lens Calculations Storage	1.2.840.10008.5.1.4.1.1.78.8	yes	yes
Intravascular Optical Coherence Tomography Image Storage For Presentation	1.2.840.10008.5.1.4.1.1.14.1	yes	yes
Intravascular Optical Coherence Tomography Image Storage For Processing	1.2.840.10008.5.1.4.1.1.14.2	yes	yes
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	yes	yes
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	yes	yes
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	yes	yes
Macular Grid Thickness And Volume Report Storage	1.2.840.10008.5.1.4.1.1.79.1	yes	yes
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	yes	yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	yes	yes
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	yes	yes
Multi Frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	yes	yes
Multi Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	yes	yes
Multi Frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	yes	yes
Multi Frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	yes	yes
Nuclear Medicine Image Storage - Retired	1.2.840.10008.5.1.4.1.1.5	yes	yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	yes	yes
Ophthalmic Axia lMeasurements Storage	1.2.840.10008.5.1.4.1.1.78.7	yes	yes
Ophthalmic Photography 16Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	yes	yes
Ophthalmic Photography 8Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	yes	yes
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	yes	yes

SOP Class Name	SOP Class UID	User	Provider
Ophthalmic Visual Field Static Perimetry Measurements Storage	1.2.840.10008.5.1.4.1.1.80.1	yes	yes
PHILIPS Private MR Examcard Storage	1.3.46.670589.11.0.0.12.4	yes	yes
PHILIPS Private MR Series Data Storage	1.3.46.670589.11.0.0.12.2	yes	yes
PHILIPS Private MR Spectrum Storage	1.3.46.670589.11.0.0.12.1	yes	yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	yes	yes
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	yes	yes
Print Queue Management SOP Class - Retired	1.2.840.10008.5.1.1.26	yes	yes
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40	yes	yes
Pseudo Color Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.3	yes	yes
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	yes	yes
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	yes	yes
Referenced Image Box SOP Class - Retired	1.2.840.10008.5.1.1.4.2	yes	yes
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1	yes	yes
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	yes	yes
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	yes	yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	yes	yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	yes	yes
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	yes	yes
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	yes	yes
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	yes	yes
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	yes	yes
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	yes	yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	yes	yes
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	yes	yes
Siemens CSA Non Image Storage	1.3.12.2.1107.5.9.1	yes	yes
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	yes	yes
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	yes	yes
Spectacle Prescription Report Storage	1.2.840.10008.5.1.4.1.1.78.6	yes	yes
Standalone Curve Storage - Retired	1.2.840.10008.5.1.4.1.1.9	yes	yes
Standalone Modality LUT Storage - Retired	1.2.840.10008.5.1.4.1.1.10	yes	yes
Standalone Overlay Storage - Retired	1.2.840.10008.5.1.4.1.1.8	yes	yes
Standalone PET Curve Storage - Retired	1.2.840.10008.5.1.4.1.1.129	yes	yes
Standalone VOILUT Storage - Retired	1.2.840.10008.5.1.4.1.1.11	yes	yes
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	yes	yes
Stored Print Storage SOP Class - Retired	1.2.840.10008.5.1.1.27	yes	yes
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4	yes	yes

SOP Class Name	SOP Class UID	User	Provider
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	yes	yes
Text SR Storage Trial - Retired	1.2.840.10008.5.1.4.1.1.88.1	yes	yes
Twelve Lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	yes	yes
Toshiba US Private Data Storage	1.2.392.200036.9116.7.8.1.1.1	yes	yes
Ultrasound Image Storage - Retired	1.2.840.10008.5.1.4.1.1.6	yes	yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	yes	yes
Ultrasound Multiframe Image Storage - Retired	1.2.840.10008.5.1.4.1.1.3	yes	yes
Ultrasound Multiframe Image Storage	1.2.840.10008.5.1.4.1.1.3.1	yes	yes
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	yes	yes
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	yes	yes
Video PhotographicImage Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	yes	yes
Visual Acuity Measurements Storage	1.2.840.10008.5.1.4.1.1.78.5	yes	yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	yes	yes
VL Image Storage - Retired	1.2.840.10008.5.1.4.1.1.77.1	yes	yes
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	yes	yes
VL Multiframe Image Storage - Retired	1.2.840.10008.5.1.4.1.1.77.2	yes	yes
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	yes	yes
VL Slide Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	yes	yes
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	yes	yes
VOILUT Box SOP Class	1.2.840.10008.5.1.1.22	yes	yes
Waveform Storage Trial - Retired	1.2.840.10008.5.1.4.1.1.9.1	yes	yes
XA/XRF Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.5	yes	yes
X-Ray Angiographic BiPlane Image Storage - Retired	1.2.840.10008.5.1.4.1.1.12.3	yes	yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	yes	yes
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	yes	yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	yes	yes
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	yes	yes
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	yes	yes

Table 43: Query/Retrieve SOP Classes for DW Application Entity

SOP Class Name	SOP Class UID	User	Provider
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	yes	no
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	yes	no
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	yes	no

SOP Class Name	SOP Class UID	User	Provider
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	yes	no

Table 44: Verification SOP Classes for DW Application Entity

SOP Class Name	SOP Class UID	User	Provider
Verification	1.2.840.10008.1.1	no	yes

3.2.2.2 Association Policies The DW Application Entity can both accept and propose Association Requests. The DW Application Entity will accept Association Requests for the Verification and Storage. It will propose Associations for the Storage and Query/Retrieve Services.

SOP Class extended negotiation is not supported.

Max PDU size offered and accepted is 16384.

The DICOM standard Application Context Name for DICOM 3.0 is always accepted and proposed:

Table 45: DICOM Application Context for DW Application Entity

	UID
Application Context Name	1.2.840.10008.3.1.1.1

3.2.2.2.1 Number Of Associations The DW Application Entity can support multiple simultaneous Associations requested by peer AEs. The maximum total number of simultaneous Associations is not limited.

DW Application Entity spawns a new thread for each connection request from remote AE or for every outgoing Association (Storage, Query/Retrieve and Modality Worklist Services). Therefore, DW can have multiple simultaneous connections, and there are no inherent limitations on the number of simultaneous associations.

3.2.2.2.2 Asynchronous Nature Asynchronous communication is not supported.

3.2.2.2.3 Implementation Identifying Information The implementation information for the DW Application Entity is:

Table 46: DICOM Implementation Class and Version for DW Application Entity

Key	Value
Implementation Class UID	1.2.826.0.1.3680043.8.1053.6
Implementation Version Name	dpgw-A.BB.CC-REL

where A.BB.CC is the release number of DPGW.

3.2.2.2.4 Association Initiation Policies DW Application Entity initiates the association:

- To send composite instances
  - WUI user action to send objects to remote AE
- To query/retrieve a remote application entity
  - WUI user action to query/retrieve data from remote AEs

Real-word activity - WUI user action to send objects to remote AE

Sequencing of Activities

DPGW Application Entity:

1. Builds a list of SOP Instance UIDs to send
2. Collects Abstract and Transfer syntaxes of those SOP Instances
3. Initiates an Association to a destination Application Entity
4. Sends SOP Instances to a destination using C-Store
5. Closes the Association

Proposed Presentation Contexts

For each Abstract Syntax, DW Application Entity proposes one or two Presentation Contexts:

- one Presentation Context (Abstract Syntax, Implicit VR Little Endian Transfer Syntax) for SOP Instances stored locally in Implicit VR Little Endian Transfer Syntax
- two Presentation Contexts (Abstract Syntax, Implicit VR Little Endian Transfer Syntax) and (Abstract Syntax, all other Transfer Syntaxes collected for that Abstract Syntax) for SOP Instances stored locally not in Implicit VR Little Endian Transfer Syntax

The set of the proposed Abstract Syntaxes is a minimal subset of supported Abstract Syntaxes needed to transfer of all SOP Instances to be sent.

Table 47: Transfer Syntaxes for Storage SOP Classes

Transfer Syntax Name	Transfer Syntax UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2
Deflated Explicit VR Little Endian	1.2.840.10008.1.2.1.99
RLE Lossless	1.2.840.10008.1.2.5
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51
JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70
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

Transfer Syntax Name	Transfer Syntax UID
JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100
MPEG2 Main Profile @ High Level	1.2.840.10008.1.2.4.101
MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102
MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103

Table 48: Proposed Presentation Contexts by the DW Application Entity

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Storage SOP Class Name in table Storage SOP Classes for DW Application Entity	Storage SOP Class UID in table Storage SOP Classes for DW Application Entity	Transfer Syntax in table Transfer Syntaxes for Storage SOP Classes for DW Application Entity	SCU	None

SOP Specific Conformance for SOP Classes

Warnings or Errors in the C-Store response from the SCP are ignored and DW Application Entity will continue to send SOP Instances. In case of error (network timeout, TCP/IP error, ...) DW Application Entity will abort the Association with an A-ABORT.

DW Application Entity modifies patient/study attributes in the SOP Instances being sent with the current metadata from internal database (in case of local PACS data) or from metadata from C-Find responses (in case of DW cahce data). Updated attributes are listed in the following table:

Table 49: Attributes updated in SOP Instance

Attribute Name	Tag Number
Study Date	(0008,0020)
Study Time	(0008,0030)
Accession Number	(0008,0050)
Referring Physician Name	(0008,0090)
Study Description	(0008,1030)
Patient ID	(0010,0020)
Issuer of Patient ID	(0010,0021)
Patient’s Birth Date	(0010,0030)
Patient’s Birth Time	(0010,0032)
Patient’s Sex	(0010,0040)
Other Patient IDs Sequence	(0010,1002)

Attribute Name	Tag Number
Patient Size	(0010,1020)
Patient Weight	(0010,1030)
Study ID	(0020,0010)
Requesting Physician	(0032,1032)

Real-word activity - WUI user instruction to query remote Application Entity

Sequencing of Activities

DW Application Entity:

1. Initiates an Association to query remote AE
2. Sends C-Find request to remote AE
3. Receives C-Find responses from remote AE
4. Closes the Association to remote AE

Proposed Presentation Contexts

Table 50: Proposed Presentation Contexts by DW Application_Entity

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian 1.2.840.10008.1.2	SCU	None

SOP Specific Conformance for SOP Classes

DW Application Entity provides standard conformance.

DW Application Entity sets Specific Character Set (0008,0005) to ISO_IR 192 by default.

DW Application Entity uses following keys in C-Find query:

Table 51: STUDY level C-FIND query

Description	Tag
Study Date	(0008,0020)
Study Time	(0008,0030)
Accession Number	(0008,0050)
Modalities in Study	(0008,0061)
Referring Physician’s Name	(0008,0090)
Study Description	(0008,1030)

Description	Tag
Patient Name	(0010,0010)
Patient ID	(0010,0020)
Patient’s Birth Date	(0010,0030)
Patient’s Sex	(0010,0040)
Study Instance UID	(0020,000D)
Study ID	(0020,0010)
Number of Study Related Series	(0020,1206)
Number of Study Related Instances	(0020,1208)
Requesting Physician	(0032,1032)
Performed Station AETitle	(0040,0241)

Table 52: SERIES level C-FIND query

Description	Tag
Study Date	(0008,0020)
Study Time	(0008,0030)
Accession Number	(0008,0050)
Modality	(0008,0060)
Referring Physician’s Name	(0008,0090)
Study Description	(0008,1030)
Series Description	(0008,103E)
Patient Name	(0010,0010)
Patient ID	(0010,0020)
Patient’s Birth Date	(0010,0030)
Patient’s Sex	(0010,0040)
Study Instance UID	(0020,000D)
Series Instance UID	(0020,000E)
Study ID	(0020,0010)
Series Number	(0020,0011)
Number of Series Related Instances	(0020,1209)
Requesting Physician	(0032,1032)
Performed Station AETitle	(0040,0241)

Table 53: IMAGE level C-FIND query

Description	Tag
SOP Class UID	(0008,0016)
SOP Instance UID	(0008,0018)
Study Date	(0008,0020)
Study Time	(0008,0030)
Accession Number	(0008,0050)
Modality	(0008,0060)
Modalities in Study	(0008,0061)
Referring Physician's Name	(0008,0090)
Study Description	(0008,1030)
Series Description	(0008,103E)
Patient Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Study Instance UID	(0020,000D)
Series Instance UID	(0020,000E)
Study ID	(0020,0010)
Series Number	(0020,0011)
Transfer Syntax UID	(0002,0010)
Instance Number	(0020,0013)
Number of Patient Related Studies	(0020,1200)
Number of Study Related Series	(0020,1206)
Number of Study Related Instances	(0020,1208)
Number of Frames	(0028,0008)
Requesting Physician	(0032,1032)
Performed Station AETitle	(0040,0241)

Real-word activity - WUI user instruction to retrieve data from remote Application Entity

Sequencing of Activities

DW Application Entity:

1. Initiates an Association to retrieve from a remote AE
2. Sends C-Move request to remote AE
3. Receives C-Move responses from remote AE
4. Closes the Association to remote AE

Proposed Presentation Contexts

Table 54: Proposed Presentation Contexts by DW Application_Entity

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian 1.2.840.10008.1.2	SCU	None

SOP Specific Conformance for SOP Classes

DW Application Entity provides standard conformance.

Real-word activity - WUI user instruction to print on DICOM printer

The DW Application Entity allows to configure if printer support printing the whole session at once or printing by film box is required.

Sequencing of Activities - Printing session

DW Application Entity:

1. Opens an association with the DICOM printer
2. N-GET on the DICOM printer is used to obtain current printer status information. If the DICOM printer reports a status of FAILURE, the print-job is switched to a failed state and the user is informed.
3. N-CREATE on the Film Session SOP Class creates a Film Session.
4. N-CREATE on the Film Box SOP Class creates a Film Box linked to the Film Session. A single Image Box will be created as the result of this operation (format and layout of the filmbox is selected according to configuration in print dialog).
5. N-SET on the Image Box SOP Class transfers the contents of the film sheet to the printer.
6. N-SET on the Annotation Box SOP class set captions on page if this feature is supported by the DICOM printer and if its configured.
7. N-ACTION on the Film Session SOP Class instructs the printer to print the entire film session.
8. The DICOM printer prints the requested number of film sheets
9. The Printer asynchronously reports its status via N-EVENT-REPORT notification (Printer SOP Class). The printer can send this message at any time. DW Application Entity does not require the N-EVENT-REPORT to be sent. DW AE ignores any status retrieved in N-EVENT-REPORT messages.
10. N-DELETE on the Film Box SOP Class deletes the film box and its content.
11. N-DELETE on the Film Session SOP Class deletes the complete Film Session SOP Instance hierarchy.
12. Closes the association with the Printer.

Steps 4-6 are repeated for every page of the print job.

Sequencing of Activities - Printing filmbox

DW Application Entity:

1. Opens an association with the DICOM printer

2. N-GET on the DICOM printer is used to obtain current printer status information. If the DICOM printer reports a status of FAILURE, the print-job is switched to a failed state and the user informed.
3. N-CREATE on the Film Session SOP Class creates a Film Session.
4. N-CREATE on the Film Box SOP Class creates a Film Box linked to the Film Session. A single Image Box will be created as the result of this operation (format and layout of the filmbox is selected according to configuration in print dialog).
5. N-SET on the Image Box SOP Class transfers the contents of the film sheet to the printer.
6. N-SET on the Annotation Box SOP class set captions on page if this feature is supported by the DICOM printer and if its configured.
7. N-ACTION on the Film Session SOP Class instructs the printer to print the entire film session.
8. The DICOM printer prints the requested number of film sheets
9. The Printer asynchronously reports its status via N-EVENT-REPORT notification (Printer SOP Class). The printer can send this message at any time. DW Application Entity does not require the N-EVENT-REPORT to be sent. DW AE ignores any status retrieved in N-EVENT-REPORT messages.
10. N-DELETE on the Film Box SOP Class deletes the film box and its content.
11. N-DELETE on the Film Session SOP Class deletes the complete Film Session SOP Instance hierarchy.
12. Closes the association with the Printer.

Steps 4-10 are repeated for every page of the print job.

3.2.2.2.5 Association Acceptance Policy DW Application Entity accepts associations from Application Entities registered in internal database. DW Application Entity accepts associations:

- to verify communication
- to store SOP Instances to the internal database

Real-word activity - communication verification request (C-Echo)

Sequencing of Activities

The DW Application Entity accepts an association from remote AE to verify communication.

Accepted Presentation Contexts

Table 55: Accepted Presentation Context (C-Echo)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Verification	1.2.840.10008.1.1	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None

SOP Specific Conformance for SOP Classes

DW Application Entity provides standard conformance.

Real-word activity - Store data to internal database request (C-Store)

Sequencing of Activities

DW Application Entity accepts an association from remote AE to store SOP Instances to internal database using C-Store command.

Accepted Presentation Contexts

Table 56: Accepted Presentation Contexts (C-Store)

Abstract Syntax Name	Abstract Syntax UID	Transfer Syntax	Role	Extended Negotiation
Storage SOP Class Name in table Storage SOP Classes for DW Application Entity	Storage SOP Class UID in table Storage SOP Classes for DW Application Entity	Transfer Syntax in table Transfer Syntaxes for Storage SOP Classes for DW Application Entity	SCP	None

DW Application Entity selects the first supported Transfer Syntax from the list of proposed Transfer Syntaxes in Presentation Context.

SOP Specific Conformance for SOP Classes

DW Application Entity provides standard conformance.

DW Application Entity in default configuration does not change or remove any Attributes. Stored Attributes are not validated if they meet the requirements of the IOD.

Status codes returned to the source application entity:

Table 57: C-Store Response Status

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The Composite SOP Instance was successfully received, verified, and stored in the system database.
Refused	Out of Resources	A700	Indicates that the instance is not valid/mismatches on identifiers or exhausted system resources . Error message is output to the application log. The SOP Instance will not be stored.

3.3 Network Interfaces

3.3.1 Physical Network Interfaces

Dicompass Gateway is indifferent to the physical medium over which TCP/IP executes. It inherits this from the Java Runtime Environment.

3.3.2 Supported communication stacks

DICOM Upper Layer as defined in Part 8 of the Standard over TCP/IP is supported.

3.3.3 Additional Protocols

Dicompass Gateway uses the DNS resolution provided by the underlying operating system and Java Runtime Environment.

3.4 Configuration

3.4.1 AE Title/Presentation address mapping

3.4.1.1 Local AE Titles The local AE Title and TCP port are configurable in main application configuration file.

Table 58: Default AE Title configuration

AE	Default AE Title	Default TCP/IP Port	Default TLS TCP/IP port
DPGW Application Entity	DPGW	5380	5383
DW Application Entity	DW	5380	5383

3.4.1.2 Remote AE Titles Remote AE Titles, TCP/IP addresses and ports can be configured in Dicompass Gateway WEB-based UI or command line interface.

3.4.2 Parameters

General parameters for both DPGW and DW Application Entities:

Table 59: Configuration parameters table

Parameter	Configurable	Default Value
Maximum PDU size the AE can send/receive	no	16384
Time-out waiting for response to TCP/IP connect request (low-level timeout)	yes	1s
Time-out for socket read (low-level timeout)	yes	28800s
Time-out waiting after opening TCP/IP connection for Association Open Request (Application Level timeout)	yes	60s
Time-out waiting for acceptance or rejection Response to an Association Open Request (Application Level timeout)	yes	60s
General DIMSE level time-out values	yes	600s
DIMSE level time-out for an open C-MOVE request	yes	600s
Size constraint in maximum object size	no	2GB
Time-out an association may remain idle	yes	1800s
SOP Class support	yes	Listed in Storage SOP Classes for DPGW Application Entity
Transfer Syntax support	yes	Listed in Transfer Syntaxes for Storage SOP Classes for DPGW Application Entity

4 Media Interchange

Dicompass Gateway does not support Media Storage.

5 Support of Character Sets

Dicompass Gateway supports following character sets:

- ISO_IR 6
- ISO_IR 100
- ISO_IR 101
- ISO_IR 192

Dicompass Gateway supports code extension techniques.

6 Security

6.1 Security Profiles

Dicompass Gateway supports Non-Downgrading BCP 195 TLS Secure Transport Connection Profile as specified in DICOM Standard, Part 15, Annex B.10.

Only TLS 1.2 and TLS 1.3 is supported, use of TLS 1.3 is preferred.

Supported ciphetsuits:

TLS 1.2:

- TLS_DHE_RSA_WITH_AES_128_GCM_SHA256
- TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256
- TLS_DHE_RSA_WITH_AES_256_GCM_SHA384
- TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384

TLS 1.3:

- TLS_AES_128_GCM_SHA256
- TLS_AES_256_GCM_SHA384

The private key and the Certificate used by an instance of *Dicompass Gateway* to identify itself in the TLS negotiation with remote applications has to be provided in a local keystore file in PKCS12 or JKS (Java Key Store) format on the application host. Certficates of Certificate Authorities (CA) to validate Certificates received from remote applications during the TLS negotiation can also be provided in a local truststore file in JKS format.

6.2 Association level security

Dicompass Gateway checks Calling AE Title and IP Address of a requester. Association is refused when values don’t match the DB records or when no record exists.

6.3 Application level security

Dicompass Gateway refuses command (C-Find, C-Store, C-Move, MWL Find) when the requesting AE is not authorized to perform it. Management of AE's roles is available in web-based UI.

7 Annexes

7.1 Data Dictionary of private Attributes

Table 60: Private Attributes

Tag	Name	VR	VM	Value
(6FDB,0010)	Private Creator	LO	1	Medoro
(6FDB,1010)	Medoro Measurement Data Model Version	US	1	Version number of measurement data model
(6FDB,1011)	Medoro Measurement DW Version	LO	1	Version number of DW
(6FDB,1012)	Medoro Measurement Store Date	DA	1	Measurement Store Date
(6FDB,1013)	Medoro Measurement Store Time	TM	1	Measurement Store Time
(6FDB,1014)	Medoro Measurement Data	UT	1	Measurement Data
(6FDB,1015)	Medoro Measurement Calibration	DS	1	Measurement calibration Data
(6FDB,1050)	Medoro Categorization Tags	LO	1	MedoroCategorizationTags
(6FDB,1015)	Medoro Categorization Tags In Study	LO	1	MedoroCategorizationTagsInStudy
(6FDB,1015)	Medoro Categorization Tags In Study Operator And	LO	1	MedoroCategorizationTagsInStudyOperatorAnd
(6FDB,1015)	Medoro Study Flags	LO	1	MedoroStudyFlags
(6FDB,1080)	Medoro VideoSync Group UID	UI	1	VideoSync Group UID
(6FDB,1081)	Medoro Video Part Count	US	1	Video Part Count
(6FDB,1082)	Medoro Video Part Index	US	1	Video Part Index
(6FDB,1083)	Medoro Video Part Duration	DS	1	Video Part Duration
(6FDB,1084)	Medoro Video Total Duration	DS	1	Video Total Duration
(6FDB,1085)	Medoro Video Marks	DS	1	Video Marks
(6FDB,1086)	Medoro Video PartsGroup UID	UI	1	Video PartsGroup UID
(6FDD,0010)	Private Creator	LO	1	Medoro Replica
(6FDD,1001)	Medoro Replicated UUIDs	LO	4	Replicated UUID hierarchy
(6FDD,1002)	Medoro Original Size	LO	1	Replicated original object size