

DBx DICOM Conformance Statement

1 Conformance Statement Overview

Mirada DBx implements the necessary DICOM services to read and write DICOM objects from the file system and DICOM network devices.

Table 1 provides an overview of the network services supported by Mirada DBx.

Table 1: Network Services

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
<i>Transfer</i>		
12-lead ECG Waveform Storage	Yes	Yes
Ambulatory ECG Waveform Storage	Yes	Yes
Arterial Pulse Waveform Storage	Yes	Yes
Autorefraction Measurements Storage	Yes	Yes
Basic Structured Display Storage	Yes	Yes
Basic Text SR	Yes	Yes
Basic Voice Audio Waveform Storage	Yes	Yes
Blending Softcopy Presentation State Storage	Yes	Yes
Breast Tomosynthesis Image Storage	Yes	Yes
Cardiac Electrophysiology Waveform Storage	Yes	Yes
Chest CAD SR	Yes	Yes
Colon CAD SR	Yes	Yes
Color Softcopy Presentation State Storage	Yes	Yes
Comprehensive SR	Yes	Yes
Computed Radiography Image Storage	Yes	Yes
CT Image Storage	Yes	Yes
Deformable Spatial Registration Storage	Yes	Yes
Digital Intra-oral X-Ray Image Storage - For Presentation	Yes	Yes
Digital Intra-oral X-Ray Image Storage - For Processing	Yes	Yes
Digital Mammography Image Storage - For Presentation	Yes	Yes
Digital Mammography Image Storage - For Processing	Yes	Yes
Digital X-Ray Image Storage - For Presentation	Yes	Yes
Digital X-Ray Image Storage - For Processing	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

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Enhanced PET Image Storage	Yes	Yes
Enhanced SR	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
Generic Implant Template Storage	Yes	Yes
Grayscale Softcopy Presentation State Storage	Yes	Yes
Hemodynamic Waveform Storage	Yes	Yes
Implant Assembly Template Storage	Yes	Yes
Implant Template Group Storage	Yes	Yes
Implantation Plan SR Document 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	Yes	Yes
Lensometry Measurements Storage	Yes	Yes
Macular Grid Thickness and Volume Report	Yes	Yes
Mammography CAD SR	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 True Color Secondary Capture Image Storage	Yes	Yes
Nuclear Medicine Image Storage	Yes	Yes
Ophthalmic Axial Measurements Storage	Yes	Yes
Ophthalmic Photography 16 Bit Image Storage	Yes	Yes
Ophthalmic Photography 8 Bit Image Storage	Yes	Yes
Ophthalmic Tomography Image Storage	Yes	Yes
Ophthalmic Visual Field Static Perimetry Measurements Storage	Yes	Yes
Positron Emission Tomography Image Storage	Yes	Yes
Procedure Log	Yes	Yes
Pseudo-Color Softcopy Presentation State Storage	Yes	Yes
Raw Data Storage	Yes	Yes
Real World Value Mapping Storage	Yes	Yes

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Respiratory Waveform Storage	Yes	Yes
RT Beams Delivery Instruction 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
Spatial Fiducials Storage	Yes	Yes
Spatial Registration Storage	Yes	Yes
Spectacle Prescription Report Storage	Yes	Yes
Stereometric Relationship Storage	Yes	Yes
Subjective Refraction Measurements Storage	Yes	Yes
Surface Segmentation Storage	Yes	Yes
Ultrasound Image Storage	Yes	Yes
Ultrasound Multi-frame Image Storage	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 Microscopic Image Storage	Yes	Yes
VL Photographic Image Storage	Yes	Yes
VL Slide-Coordinates Microscopic Image Storage	Yes	Yes
VL Whole Slide Microscopy Image Storage	Yes	Yes
X-Ray 3D Angiographic Image Storage	Yes	Yes
X-Ray 3D Craniofacial Image Storage	Yes	Yes
X-Ray Angiographic Image Storage	Yes	Yes
X-Ray Radiation Dose SR	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	Yes	Yes
XA/XRF Grayscale Softcopy Presentation State Storage	Yes	Yes
<i>Query/Retrieve</i>		
Patient Root Query/Retrieve Information Model – FIND	Yes	Yes
Patient Root Query/Retrieve Information Model – MOVE	Yes	Yes
Study Root Query/Retrieve Information Model – FIND	Yes	Yes

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Study Root Query/Retrieve Information Model – MOVE	Yes	Yes

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3 Introduction

3.1 Revision History

Revision	Date	Description
1.0-0	11-10-2012	Issued for DBx 1.0.
1.1-0	06-08-2013	Issued for DBx 1.1.
1.2-0	28-01-2016	Issued for DBx 1.2.

3.2 Audience

This document is written for the people that need to understand how Mirada DBx 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.

3.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between Mirada DBx 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.

3.4 Terms and Definitions

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 – 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).

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.

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 (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the “group” and the “element”. If the “group” number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique “dotted decimal” string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person’s name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.5 Basics of DICOM Communication

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted in *italics* below. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two *Application Entities* (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network “handshake”. One of the two devices must initiate an *Association* (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (*Negotiation*).

DICOM specifies a number of network services and types of information objects, each of which is called an *Abstract Syntax* for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted *Transfer Syntaxes*. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called *Presentation Contexts*. The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on *Roles* – which one is the *Service Class User* (SCU - client) and which is the *Service Class Provider* (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (*PDU*) size, security information, and network service options (called *Extended Negotiation* information).

The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate *Information Object Definition*, and sent using the negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. Each transfer is explicitly acknowledged by the receiver with a *Response Status* indicating success, failure, or that query or retrieve operations are still in process.

Two Application Entities may also communicate with each other by exchanging media (such as a CD-R). Since there is no Association Negotiation possible, they both use a *Media Application Profile* that specifies “pre-negotiated” exchange media format, Abstract Syntax, and Transfer Syntax.

3.6 Abbreviations

AE	Application Entity
AET	Application Entity Title
CAD	Computer Aided Detection
CDA	Clinical Document Architecture
CD-R	Compact Disk Recordable
CSE	Customer Service Engineer
CR	Computed Radiography
CT	Computed Tomography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DIT	Directory Information Tree (LDAP)
DN	Distinguished Name (LDAP)
DNS	Domain Name System
DX	Digital X-ray
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
GSDF	Grayscale Standard Display Function
GSPS	Grayscale Softcopy Presentation State
HIS	Hospital Information System
HL7	Health Level 7 Standard

IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standards
IO	Intra-oral X-ray
JPEG	Joint Photographic Experts Group
LDAP	Lightweight Directory Access Protocol
LDIF	LDAP Data Interchange Format
LUT	Look-up Table
MAR	Medication Administration Record
MPEG	Moving Picture Experts Group
MG	Mammography (X-ray)
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance Imaging
MSPS	Modality Scheduled Procedure Step
MTU	Maximum Transmission Unit (IP)
MWL	Modality Worklist
NM	Nuclear Medicine
NTP	Network Time Protocol
O	Optional (Key Attribute)
OP	Ophthalmic Photography
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PET	Positron Emission Tomography
PDU	Protocol Data Unit
R	Required (Key Attribute)
RDN	Relative Distinguished Name (LDAP)
RF	Radiofluoroscopy
RIS	Radiology Information System.
RT	Radiotherapy
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User

SOP	Service-Object Pair
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol
U	Unique (Key Attribute)
UL	Upper Layer
VR	Value Representation

3.7 References

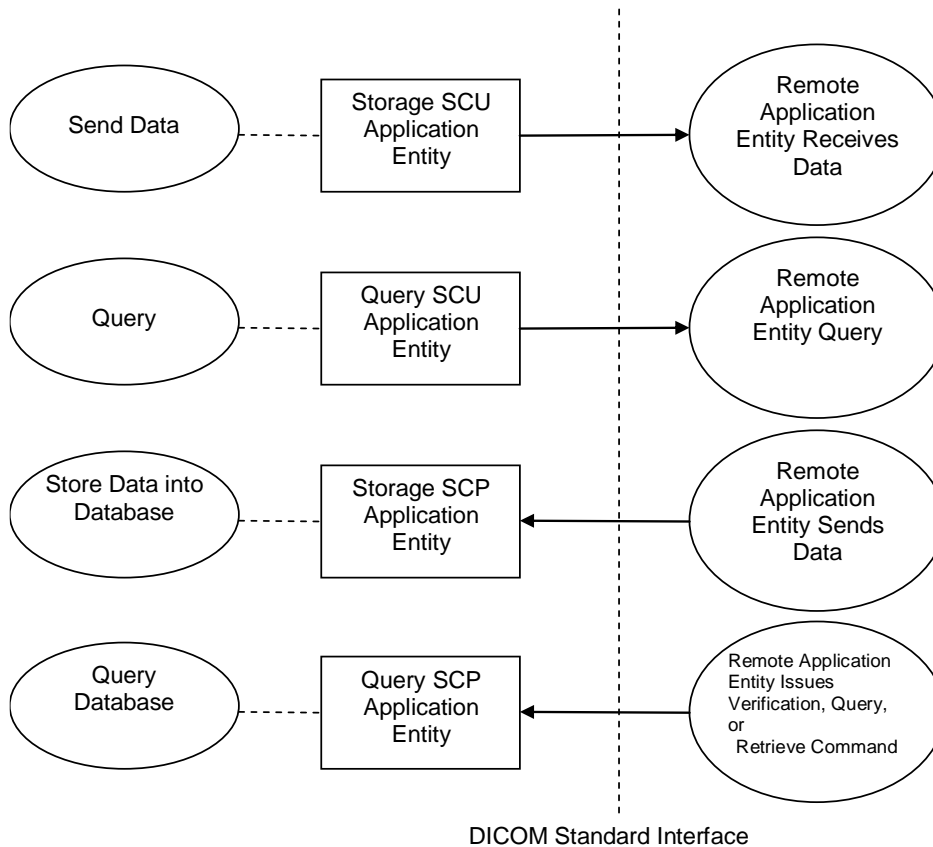
NEMA PS3	Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/ .
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4 Networking

4.1 Implementation Model

4.1.1 Application Data Flow

By default, all of the defined Application Entities have the same AE Title.



- The Storage SCU Application Entity sends data from the database to remote Application Entities.
- The Query SCU Application Entity queries remote Application Entities for data.
- The Storage SCP Application Entity receives data from remote Application Entities and stores it in the database.
- The Query SCP Application Entity receives queries from remote Application Entities and queries the database.

4.1.2 Functional Definition of AEs

4.1.2.1 Functional Definition of Storage SCU Application Entity

The Storage SCU is invoked by the user or by the Query SCP AE to send data stored in the DBx database to a remote destination AE.

4.1.2.2 Functional Definition of Query SCU Application Entity

The Query SCU is invoked by the user to perform a query of a remote destination AE.

4.1.2.3 Functional Definition of Storage SCP Application Entity

The Storage SCP waits for another application to connect at the presentation addresses configured for its AE Title. The Storage SCP will accept Associations with Presentation Contexts for SOP Classes of the Verification and Storage Service Classes. Objects received through Storage Service Classes will be written to the DBx database.

4.1.2.4 Functional Definition of Query SCP Application Entity

The Storage SCP waits for another application to connect at the presentation addresses configured for its AE Title. The Storage SCP will accept Associations with Presentation Contexts for SOP Classes of the Verification and Query/Retrieve Service Classes. Queries received will be performed on the DBx database.

4.2 AE Specifications

4.2.1 Storage SCU Application Entity Specification

4.2.1.1 SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes:

Table 2: SOP Classes for AE Storage

SOP Class Name	SOP Class UID	SCU	SCP
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	No
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Yes	No
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	Yes	No
Autorefracton Measurements Storage	1.2.840.10008.5.1.4.1.1.78.2	Yes	No
Basic Structured Display Storage	1.2.840.10008.5.1.4.1.1.131	Yes	No
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Yes	No
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Yes	No
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4	Yes	No
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	Yes	No
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Yes	No
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Yes	No
Colon CAD SR	1.2.840.10008.5.1.4.1.1.88.69	Yes	No
Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.2	Yes	No
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Yes	No
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	No
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	No
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3	Yes	No
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Yes	No
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	No
Digital Mammography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Yes	No
Digital Mammography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	No
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Yes	No
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	No
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes	No
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	Yes	No
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes	No
Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.130	Yes	No
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Yes	No
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	Yes	No
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	Yes	No
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	Yes	No
General Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.2	Yes	No

SOP Class Name	SOP Class UID	SCU	SCP
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	No
Generic Implant Template Storage	1.2.840.10008.5.1.4.43.1	Yes	No
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	No
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	No
Implant Assembly Template Storage	1.2.840.10008.5.1.4.44.1	Yes	No
Implant Template Group Storage	1.2.840.10008.5.1.4.45.1	Yes	No
Implantation Plan SR Document Storage	1.2.840.10008.5.1.4.1.1.88.70	Yes	No
Intraocular Lens Calculations Storage	1.2.840.10008.5.1.4.1.1.78.8	Yes	No
Intravascular Optical Coherence Tomography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.14.1	Yes	No
Intravascular Optical Coherence Tomography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.14.2	Yes	No
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	Yes	No
Key Object Selection	1.2.840.10008.5.1.4.1.1.88.59	Yes	No
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	Yes	No
Macular Grid Thickness and Volume Report	1.2.840.10008.5.1.4.1.1.79.1	Yes	No
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Yes	No
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	No
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	No
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	No
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Yes	No
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Yes	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	No
Ophthalmic Axial Measurements Storage	1.2.840.10008.5.1.4.1.1.78.7	Yes	No
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	No
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	No
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	Yes	No
Ophthalmic Visual Field Static Perimetry Measurements Storage	1.2.840.10008.5.1.4.1.1.80.1	Yes	No
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	No
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Yes	No
Pseudo-Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.3	Yes	No
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Yes	No
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	Yes	No
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1	Yes	No
RT Beams Delivery Instruction Storage	1.2.840.10008.5.1.4.34.7	Yes	No
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes	No
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Yes	No
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes	No
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	No
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	Yes	No

SOP Class Name	SOP Class UID	SCU	SCP
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	Yes	No
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	No
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes	No
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Yes	No
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	Yes	No
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Yes	No
Spectacle Prescription Report Storage	1.2.840.10008.5.1.4.1.1.78.6	Yes	No
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	Yes	No
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4	Yes	No
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	Yes	No
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	No
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	No
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	No
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	Yes	No
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	No
Visual Acuity Measurements Storage	1.2.840.10008.5.1.4.1.1.78.5	Yes	No
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	No
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	No
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	No
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Yes	No
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	Yes	No
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	Yes	No
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	Yes	No
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Yes	No
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	No
XA/XRF Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.5	Yes	No

4.2.1.2 Association Establishment Policies

4.2.1.2.1 General

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

Table 3: DICOM Application Context for AE Storage SCU

Application Context Name	1.2.840.10008.3.1.1.1
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4.2.1.2.2 Number of Associations

Table 4: Number of Associations as an Association Initiator for AE Storage SCU

Maximum number of simultaneous associations	Unlimited
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4.2.1.2.3 Asynchronous Nature

Mirada DBx does not support asynchronous communication (multiple outstanding transactions over a single Association).

Table 5: Asynchronous Nature as an Association Initiator for AE Storage SCU

Maximum number of outstanding asynchronous transactions	1
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4.2.1.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 6: DICOM Implementation Class and Version for AE Storage SCU

Implementation Class UID	1.2.826.0.1.3680043.8.691.0.50
Implementation Version Name	1.2.0

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – Send Data

4.2.1.3.1.1 Description and Sequencing of Activity

A request to send data to a remote AE can come from either a user interaction or from a C-MOVE request received by the Query SCP. The Storage AE initiates a C-STORE request to store images. If the process successfully establishes an Association to a remote Application Entity, it will transfer each marked instance one after another via the open Association. If the C-STORE Response from the remote Application contains a status other than Success or Warning, the Association is aborted and user notified.

4.2.1.3.1.2 Proposed Presentation Contexts

Mirada DBx is capable of proposing the Presentation Contexts shown in the following table. This list is configurable.

Table 7: Proposed Presentation Contexts for AE Storage SCU

Abstract Syntaxes	Transfer Syntaxes	Role	Extended Negotiation
12-lead ECG Waveform Storage	Little Endian Implicit VR	SCU	None
Ambulatory ECG Waveform Storage	Little Endian Explicit VR		
Arterial Pulse Waveform Storage			
Autorefraction Measurements Storage	Deflated Little Endian Explicit VR		
Basic Structured Display Storage			
Basic Text SR	Lossless JPEG Image Compression		
Basic Voice Audio Waveform Storage			
Blending Softcopy Presentation State Storage	Lossless JPEG Image Compression with first-order prediction		
Breast Tomosynthesis Image Storage	Lossless JPEG 2000 Image		
Cardiac Electrophysiology Waveform Storage			

Abstract Syntaxes	Transfer Syntaxes	Role	Extended Negotiation
Chest CAD SR	Compression		
Colon CAD SR			
Color Softcopy Presentation State Storage	Lossy JPEG 2000 Image		
Comprehensive SR	Compression		
Computed Radiography Image Storage			
CT Image Storage	Lossy JPEG Baseline Image		
Deformable Spatial Registration Storage	Compression		
Digital Intra-oral X-Ray Image Storage - For Presentation	Lossy JPEG Extended Image		
Digital Intra-oral X-Ray Image Storage - For Processing	Compression		
Digital Mammography Image Storage - For Presentation			
Digital Mammography Image Storage - For Processing			
Digital X-Ray Image Storage - For Presentation			
Digital X-Ray Image Storage - For Processing			
Encapsulated CDA Storage			
Encapsulated PDF Storage			
Enhanced CT Image Storage			
Enhanced MR Color Image Storage			
Enhanced MR Image Storage			
Enhanced PET Image Storage			
Enhanced SR			
Enhanced US Volume Storage			
Enhanced XA Image Storage			
Enhanced XRF Image Storage			
General Audio Waveform Storage			
General ECG Waveform Storage			
Generic Implant Template Storage			
Grayscale Softcopy Presentation State Storage			
Hemodynamic Waveform Storage			
Implant Assembly Template Storage			
Implant Template Group Storage			
Implantation Plan SR Document Storage			
Intraocular Lens Calculations Storage			
Intravascular Optical Coherence Tomography Image Storage - For Presentation			
Intravascular Optical Coherence Tomography Image Storage - For Processing			
Keratometry Measurements Storage			
Key Object Selection			

Abstract Syntaxes	Transfer Syntaxes	Role	Extended Negotiation
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Lensometry Measurements Storage
Macular Grid Thickness and Volume Report
Mammography CAD SR
MR Image Storage
MR Spectroscopy Storage
Multi-frame Grayscale Byte Secondary Capture Image Storage
Multi-frame Grayscale Word Secondary Capture Image Storage
Multi-frame Single Bit Secondary Capture Image Storage
Multi-frame True Color Secondary Capture Image Storage
Nuclear Medicine Image Storage
Ophthalmic Axial Measurements Storage
Ophthalmic Photography 16 Bit Image Storage
Ophthalmic Photography 8 Bit Image Storage
Ophthalmic Tomography Image Storage
Ophthalmic Visual Field Static Perimetry Measurements Storage
Positron Emission Tomography Image Storage
Procedure Log
Pseudo-Color Softcopy Presentation State Storage
Raw Data Storage
Real World Value Mapping Storage
Respiratory Waveform Storage
RT Beams Delivery Instruction Storage
RT Beams Treatment Record Storage
RT Brachy Treatment Record Storage
RT Dose Storage
RT Image Storage
RT Ion Beams Treatment Record Storage
RT Ion Plan Storage
RT Plan Storage
RT Structure Set Storage
RT Treatment Summary Record Storage
Secondary Capture Image Storage
Segmentation Storage
Spatial Fiducials Storage
Spatial Registration Storage
Spectacle Prescription Report Storage

Abstract Syntaxes	Transfer Syntaxes	Role	Extended Negotiation
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Stereometric Relationship Storage
Subjective Refraction Measurements Storage
Surface Segmentation Storage
Ultrasound Image Storage
Ultrasound Multi-frame Image Storage
Video Endoscopic Image Storage
Video Microscopic Image Storage
Video Photographic Image Storage
Visual Acuity Measurements Storage
VL Endoscopic Image Storage
VL Microscopic Image Storage
VL Photographic Image Storage
VL Slide-Coordinates Microscopic Image Storage
VL Whole Slide Microscopy Image Storage
X-Ray 3D Angiographic Image Storage
X-Ray 3D Craniofacial Image Storage
X-Ray Angiographic Image Storage
X-Ray Radiation Dose SR
X-Ray Radiofluoroscopic Image Storage
XA/XRF Grayscale Softcopy Presentation State Storage

4.2.1.3.1.3 SOP Specific Conformance for SOP Classes

All Storage SOP Classes supported by the Storage AE exhibit the same behavior, except where stated, and are described together in this section.

If a SOP Instance is included in the task and a corresponding Presentation Context is not accepted then the Association is aborted using A-P-ABORT and the task is failed. The failure is logged and reported to the user.

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The SCP has successfully stored the SOP Instance. If all SOP Instances have status success then the task is marked as complete.
Refused	Out of Resources	A700-A7FF	The Association is aborted using A-ABORT and the task is marked as failed. The status meaning is logged and the task failure is reported to the user. This is a transient failure.
Error	Data Set does not match SOP Class	A900-A9FF	The Association is aborted using A-ABORT and the task is marked as failed. The status meaning is logged and the task failure is reported to the user.

Service Status	Further Meaning	Error Code	Behavior
Error	Cannot Understand	C000-CFFF	The Association is aborted using A-ABORT and the task is marked as failed. The status meaning is logged and the job failure is reported to the user.
Warning	Coercion of Data Elements	B000	Image transmission is considered successful but the status meaning is logged.
Warning	Data Set does not match SOP Class	B007	Image transmission is considered successful but the status meaning is logged.
Warning	Elements Discarded	B006	Image transmission is considered successful but the status meaning is logged.
*	*	Any other status code.	The Association is aborted using A-ABORT and the task is marked as failed. The status code is logged and the task failure is reported to the user.

The behavior of the Storage SCU AE during communication failure is summarized in the Table below:

Exception	Behavior
Timeout	The Association is aborted using A-ABORT. The reason is logged and the failure is reported to either the user or the C-MOVE SCU.
Association aborted by the SCP or network layers	The reason is logged and the failure is reported to either the user or the C-MOVE SCU.

4.2.2 Query SCU Application Entity Specification

4.2.2.1 SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes:

Table 8: SOP Classes for AE Query SCU

SOP Class Name	SOP Class UID	SCU	SCP
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
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	No

4.2.2.2 Association Establishment Policies

4.2.2.2.1 General

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

Table 9: DICOM Application Context for AE Query SCU

Application Context Name	1.2.840.10008.3.1.1.1
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4.2.2.2.2 Number of Associations

Table 10: Number of Associations as an Association Initiator for AE Query SCU

Maximum number of simultaneous associations	Unlimited
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4.2.2.2.3 Asynchronous Nature

Mirada DBx does not support asynchronous communication (multiple outstanding transactions over a single Association).

Table 11: Asynchronous Nature as an Association Initiator for AE Query SCU

Maximum number of outstanding asynchronous transactions	1
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4.2.2.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 12: DICOM Implementation Class and Version for AE Query SCU

Implementation Class UID	1.2.826.0.1.3680043.8.691.0.50
Implementation Version Name	1.2.0

4.2.2.3 Association Initiation Policy

4.2.2.3.1 Activity – Query

4.2.2.3.1.1 Description and Sequencing of Activity

The Query SCU is invoked by a user action to perform a query against a remote Application Entity and retrieve data from it.

4.2.2.3.1.2 Proposed Presentation Contexts

Mirada DBx is capable of proposing the Presentation Contexts shown in the following table.

Table 13: Proposed Presentation Contexts for AE Query SCU

Abstract Syntaxes	Transfer Syntaxes	Role	Extended Negotiation
Patient Root Query/Retrieve Information Model – FIND	Little Endian Implicit VR Little Endian Explicit VR	SCU	None
Patient Root Query/Retrieve Information Model – MOVE	Little Endian Implicit VR Little Endian Explicit VR	SCU	None
Study Root Query/Retrieve Information Model – FIND	Little Endian Implicit VR Little Endian Explicit VR	SCU	None
Study Root Query/Retrieve Information Model – MOVE	Little Endian Implicit VR Little Endian Explicit VR	SCU	None

4.2.3 Storage SCP Application Entity Specification

4.2.3.1 SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes:

Table 14: SOP Classes for AE Storage SCP

SOP Class Name	SOP Class UID	SCU	SCP
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	No	Yes
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	No	Yes
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	No	Yes
Autorefraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.2	No	Yes
Basic Structured Display Storage	1.2.840.10008.5.1.4.1.1.131	No	Yes
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	No	Yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	No	Yes
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4	No	Yes
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	No	Yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	No	Yes
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	No	Yes
Colon CAD SR	1.2.840.10008.5.1.4.1.1.88.69	No	Yes
Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.2	No	Yes
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	No	Yes
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	No	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	No	Yes
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3	No	Yes
Digital Intra-oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	No	Yes
Digital Intra-oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	No	Yes
Digital Mammography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	No	Yes
Digital Mammography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	No	Yes
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	No	Yes
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	No	Yes
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2	No	Yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	No	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	No	Yes
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	No	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	No	Yes
Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.130	No	Yes
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	No	Yes
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	No	Yes
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	No	Yes
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	No	Yes
General Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.2	No	Yes
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	No	Yes
Generic Implant Template Storage	1.2.840.10008.5.1.4.43.1	No	Yes

SOP Class Name	SOP Class UID	SCU	SCP
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	No	Yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	No	Yes
Implant Assembly Template Storage	1.2.840.10008.5.1.4.44.1	No	Yes
Implant Template Group Storage	1.2.840.10008.5.1.4.45.1	No	Yes
Implantation Plan SR Document Storage	1.2.840.10008.5.1.4.1.1.88.70	No	Yes
Intraocular Lens Calculations Storage	1.2.840.10008.5.1.4.1.1.78.8	No	Yes
Intravascular Optical Coherence Tomography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.14.1	No	Yes
Intravascular Optical Coherence Tomography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.14.2	No	Yes
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	No	Yes
Key Object Selection	1.2.840.10008.5.1.4.1.1.88.59	No	Yes
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	No	Yes
Macular Grid Thickness and Volume Report	1.2.840.10008.5.1.4.1.1.79.1	No	Yes
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	No	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	No	Yes
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	No	Yes
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	No	Yes
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	No	Yes
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	No	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	No	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	No	Yes
Ophthalmic Axial Measurements Storage	1.2.840.10008.5.1.4.1.1.78.7	No	Yes
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	No	Yes
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	No	Yes
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	No	Yes
Ophthalmic Visual Field Static Perimetry Measurements Storage	1.2.840.10008.5.1.4.1.1.80.1	No	Yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	No	Yes
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	No	Yes
Pseudo-Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.3	No	Yes
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	No	Yes
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	No	Yes
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1	No	Yes
RT Beams Delivery Instruction Storage	1.2.840.10008.5.1.4.34.7	No	Yes
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	No	Yes
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	No	Yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	No	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	No	Yes
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	No	Yes

SOP Class Name	SOP Class UID	SCU	SCP
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	No	Yes
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	No	Yes
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	No	Yes
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	No	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	No	Yes
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	No	Yes
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	No	Yes
Spectacle Prescription Report Storage	1.2.840.10008.5.1.4.1.1.78.6	No	Yes
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5. 3	No	Yes
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4	No	Yes
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	No	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1. 1	No	Yes
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2. 1	No	Yes
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4. 1	No	Yes
Visual Acuity Measurements Storage	1.2.840.10008.5.1.4.1.1.78.5	No	Yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	No	Yes
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	No	Yes
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	No	Yes
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	No	Yes
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	No	Yes
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	No	Yes
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	No	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	No	Yes
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	No	Yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	No	Yes
XA/XRF Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.5	No	Yes

4.2.3.2 Association Policies

The Storage SCP AE does not initiate Associations.

4.2.3.2.1 General

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

Table 15: DICOM Application Context for AE Storage SCP

Application Context Name	1.2.840.10008.3.1.1.1
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4.2.3.2.2 Number of Associations

Table 16: Number of Associations as an Association Acceptor for AE Storage SCP

Maximum number of simultaneous associations	Unlimited
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4.2.3.2.3 Asynchronous Nature

Mirada DBx does not support asynchronous communication (multiple outstanding transactions over a single Association).

Table 17: Asynchronous Nature as an Association Initiator for AE Storage SCP

Maximum number of outstanding asynchronous transactions	1
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4.2.3.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 18: DICOM Implementation Class and Version for AE Storage SCP

Implementation Class UID	1.2.826.0.1.3680043.8.691.0.50
Implementation Version Name	1.2.0

4.2.3.3 Association Acceptance Policy

4.2.3.3.1 Activity – Remote Application Entity Sends Data

4.2.3.3.1.1 Description and Sequencing of Activity

The Storage SCP AE accepts Associations from a remote AE. DICOM SOP Instances received via Storage SOP Classes are stored in the DBx database.

4.2.3.3.1.2 Proposed Presentation Contexts

Mirada DBx can accept the Presentation Contexts shown in the following table. This list is configurable.

Table 19: Accepted Presentation Contexts for AE Storage SCP

Abstract Syntaxes	Transfer Syntaxes	Role	Extended Negotiation
12-lead ECG Waveform Storage	Little Endian Implicit VR	SCU	None
Ambulatory ECG Waveform Storage			
Arterial Pulse Waveform Storage	Little Endian Explicit VR		
Autorefraction Measurements Storage	Deflated Little Endian Explicit VR		
Basic Structured Display Storage			
Basic Text SR	Lossless JPEG Image Compression		
Basic Voice Audio Waveform Storage			
Blending Softcopy Presentation State Storage	Lossless JPEG Image Compression with first-order prediction		
Breast Tomosynthesis Image Storage			

Abstract Syntaxes	Transfer Syntaxes	Role Extended Negotiation
Cardiac Electrophysiology Waveform Storage	Lossless JPEG 2000 Image Compression	
Chest CAD SR		
Colon CAD SR	Lossy JPEG 2000 Image Compression	
Color Softcopy Presentation State Storage		
Comprehensive SR	Lossy JPEG Baseline Image Compression	
Computed Radiography Image Storage		
CT Image Storage		
Deformable Spatial Registration Storage	Lossy JPEG Extended Image Compression	
Digital Intra-oral X-Ray Image Storage - For Presentation		
Digital Intra-oral X-Ray Image Storage - For Processing		
Digital Mammography Image Storage - For Presentation		
Digital Mammography Image Storage - For Processing		
Digital X-Ray Image Storage - For Presentation		
Digital X-Ray Image Storage - For Processing		
Encapsulated CDA Storage		
Encapsulated PDF Storage		
Enhanced CT Image Storage		
Enhanced MR Color Image Storage		
Enhanced MR Image Storage		
Enhanced PET Image Storage		
Enhanced SR		
Enhanced US Volume Storage		
Enhanced XA Image Storage		
Enhanced XRF Image Storage		
General Audio Waveform Storage		
General ECG Waveform Storage		
Generic Implant Template Storage		
Grayscale Softcopy Presentation State Storage		
Hemodynamic Waveform Storage		
Implant Assembly Template Storage		
Implant Template Group Storage		
Implantation Plan SR Document Storage		
Intraocular Lens Calculations Storage		
Intravascular Optical Coherence Tomography Image Storage - For Presentation		
Intravascular Optical Coherence Tomography Image Storage - For Processing		

Abstract Syntaxes	Transfer Syntaxes	Role	Extended Negotiation
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Keratometry Measurements Storage
Key Object Selection
Lensometry Measurements Storage
Macular Grid Thickness and Volume Report
Mammography CAD SR
MR Image Storage
MR Spectroscopy Storage
Multi-frame Grayscale Byte Secondary Capture Image Storage
Multi-frame Grayscale Word Secondary Capture Image Storage
Multi-frame Single Bit Secondary Capture Image Storage
Multi-frame True Color Secondary Capture Image Storage
Nuclear Medicine Image Storage
Ophthalmic Axial Measurements Storage
Ophthalmic Photography 16 Bit Image Storage
Ophthalmic Photography 8 Bit Image Storage
Ophthalmic Tomography Image Storage
Ophthalmic Visual Field Static Perimetry Measurements Storage
Positron Emission Tomography Image Storage
Procedure Log
Pseudo-Color Softcopy Presentation State Storage
Raw Data Storage
Real World Value Mapping Storage
Respiratory Waveform Storage
RT Beams Delivery Instruction Storage
RT Beams Treatment Record Storage
RT Brachy Treatment Record Storage
RT Dose Storage
RT Image Storage
RT Ion Beams Treatment Record Storage
RT Ion Plan Storage
RT Plan Storage
RT Structure Set Storage
RT Treatment Summary Record Storage
Secondary Capture Image Storage
Segmentation Storage
Spatial Fiducials Storage

Abstract Syntaxes	Transfer Syntaxes	Role	Extended Negotiation
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Spatial Registration Storage
Spectacle Prescription Report Storage
Stereometric Relationship Storage
Subjective Refraction Measurements Storage
Surface Segmentation Storage
Ultrasound Image Storage
Ultrasound Multi-frame Image Storage
Video Endoscopic Image Storage
Video Microscopic Image Storage
Video Photographic Image Storage
Visual Acuity Measurements Storage
VL Endoscopic Image Storage
VL Microscopic Image Storage
VL Photographic Image Storage
VL Slide-Coordinates Microscopic Image Storage
VL Whole Slide Microscopy Image Storage
X-Ray 3D Angiographic Image Storage
X-Ray 3D Craniofacial Image Storage
X-Ray Angiographic Image Storage
X-Ray Radiation Dose SR
X-Ray Radiofluoroscopic Image Storage
XA/XRF Grayscale Softcopy Presentation State Storage

4.2.3.3.1.3 SOP Specific Conformance for SOP Classes

All Storage SOP Classes supported by the Storage AE exhibit the same behavior, except where stated, and are described together in this section.

If a SOP Instance is included in the task and a corresponding Presentation Context is not accepted then the Association is aborted using A-P-ABORT and the task is failed. The failure is logged and reported to the user.

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The Composite SOP Instance was successfully received and stored in the database.
Error	Data Set does not match SOP Class	A900	Indicates that the Data Set did not encode a valid instance of the SOP Class specified.
Error	Processing Failure	0110	Indicates that an error occurred when receiving or storing the instance. Further error detail will be in the DBx log file.

In the case of communication failure, any successfully stored objects remain stored, while any objects partially received are discarded.

Objects stored are placed in the DBx database configured for that AE Title. The data remains in the database and may be accessed using the Query SCP or the application user interface until it is deleted, either by means of the auto-delete functionality or through a user action.

4.2.4 Query SCP Application Entity Specification

4.2.4.1 SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes:

Table 20: SOP Classes for AE Query SCP

SOP Class Name	SOP Class UID	SCU	SCP
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	No	Yes
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	No	Yes
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	No	Yes

4.2.4.2 Association Establishment Policies

4.2.4.2.1 General

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

Table 21: DICOM Application Context for AE Query SCP

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

4.2.4.2.2 Number of Associations

Table 22: Number of Associations as an Association Acceptor for AE Query SCP

Maximum number of simultaneous associations	Unlimited
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4.2.4.2.3 Asynchronous Nature

Mirada DBx does not support asynchronous communication (multiple outstanding transactions over a single Association).

Table 23: Asynchronous Nature as an Association Initiator for AE Query SCP

Maximum number of outstanding asynchronous transactions	1
---	---

4.2.4.2.4 Implementation Identifying Information

The implementation information for this Application Entity is:

Table 24: DICOM Implementation Class and Version for AE Query SCP

Implementation Class UID	1.2.826.0.1.3680043.8.691.0.50
Implementation Version Name	1.2.0

4.2.4.1 Association Acceptance Policy

4.2.4.1.1 Activity – Query Database

4.2.4.1.1.1 Description and Sequencing of Activity

A remote Application Entity performs a C-FIND query or a C-MOVE retrieval request. In the case of C-FIND, DBx queries the database and returns the query result. In the case of C-MOVE, DBx retrieves the data and sends it via C-STORE sub-operations to the specified retrieval destination.

4.2.4.1.1.2 Proposed Presentation Contexts

Mirada DBx can accept the Presentation Contexts shown in the following table.

Table 25: Accepted Presentation Contexts for AE Query SCP

Abstract Syntaxes	Transfer Syntaxes	Role	Extended Negotiation
Patient Root Query/Retrieve Information Model – FIND	Little Endian Implicit VR Little Endian Explicit VR	Yes	None
Patient Root Query/Retrieve Information Model – MOVE	Little Endian Implicit VR Little Endian Explicit VR	Yes	None
Study Root Query/Retrieve Information Model – FIND	Little Endian Implicit VR Little Endian Explicit VR	Yes	None
Study Root Query/Retrieve Information Model – MOVE	Little Endian Implicit VR Little Endian Explicit VR	Yes	None

4.2.4.1.1.3 SOP Specific Conformance for SOP Classes

Wild Card Matching for PN Values is accomplished by converting the Person Name to a DICOM formatted string and performing a case-insensitive string match.

Priority processing is not supported and priority values will be ignored.

Relational queries and fuzzy semantic matching are not supported.

Timezone Offset From UTC (0008,0201) is not processed and will be ignored. Specific Character Set (0008,0005) is processed and all text values converted to Unicode before matching.

C-STORE sub-operations generated by a C-MOVE request take place using the AE Storage SCU and may use any of its supported SOP Classes.

The following Optional Keys are supported for the Patient Level of the Patient Root Query/Retrieve Information Model:

Description	Tag
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Number of Patient Related Studies	(0020,1200)

The following Optional Keys are supported for the Study Level of the Patient Root Query/Retrieve Information Model and the Study Root Query/Retrieve Information Model:

Description	Tag
Study Description	(0008,1030)
Referring Physician's Name	(0008,0090)
Number of Study Related Series	(0020,1206)
Number of Study Related Instances	(0020,1208)

The following Optional Keys are supported for the Series Level of the Patient Root Query/Retrieve Information Model and the Study Root Query/Retrieve Information Model:

Description	Tag
Series Date	(0008,0021)
Series Time	(0008,0031)
Series Description	(0008,103E)
Number of Series Related Instances	(0020,1209)

The following Optional Keys are supported for the Composite Object Instance Level of the Patient Root Query/Retrieve Information Model and the Study Root Query/Retrieve Information Model:

Description	Tag
SOP Class UID	(0008,0016)

4.3 Network Interfaces

No network interfaces are implemented by this software.

4.4 Configuration

4.4.1 AE Title/Presentation Address Mapping

4.4.1.1 Local AE Titles

The AE Titles for each of the Application Entities may be configured through the application configuration user interface.

Table 26: AE Title Configuration Table

Application Entity	Default AE Title	Default TCP/IP Port
AE Storage SCU	(name of local machine)	(not applicable)
AE Storage SCP	(name of local machine)	104 (unsecure), 2762 (TLS)
AE Query SCU	(name of local machine)	(not applicable)
AE Query SCP	(name of local machine)	104 (unsecure), 2762 (TLS)

4.4.1.2 Remote AE Title/Presentation Address Mapping

The AE Title, host names and port numbers of remote applications are configured using the application configuration user interface.

4.4.2 Parameters

The ARTIM timeout may be configured for each remote application.

5 Media Interchange

5.1 Implementation Model

5.1.1 Application Data Flow Diagram

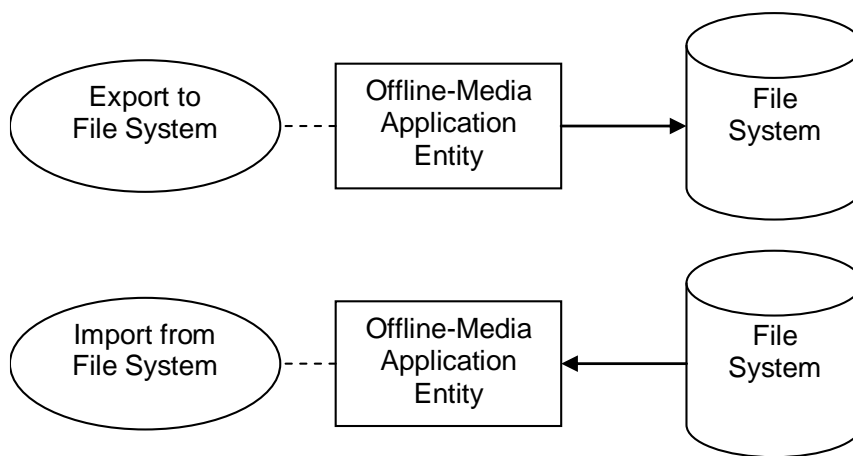


Figure 1: Application Data Flow Diagram for Media Storage

- The Offline-Media Application Entity exports images and Presentation States to CD-R, DVD-RAM or any other location in the file system. It is associated with the local real-world activities “Export to File System” and “Import from File System”.

5.1.2 Functional definitions of AEs

5.1.2.1 Functional Definition of Offline-Media Application Entity

The Offline-Media Application Entity is invoked by user action to either import data from a selected location on the filesystem or to export it to selected location on the file system, including holding areas for CD/DVD/BD burning software.

5.1.3 File Meta Information for Implementation Class and Version

The implementation information written to the File Meta Header in each file is:

Table 27: DICOM Implementation Class and Version for Media Storage

Implementation Class UID	1.2.826.0.1.3680043.8.691.0.50
Implementation Version Name	1.2.0

5.2 AE Specifications

5.2.1 Offline-Media Application Entity Specification

The Offline-Media Application Entity provides standard conformance to the Media Storage Service Class. The Application Profiles and roles are listed below:

Table 28: Application Profiles, Activities and Roles for Offline-Media

Application Profiles Supported	Real World Activity	Role
STD-GEN-CD	Import from File System Export to File System	FSR/FSC
STD-GEN-DVD-RAM	Import from File System Export to File System	FSR/FSC
STD-GEN-BD	Import from File System Export to File System	FSR/FSC
STD-CTMR-CD	Import from File System Export to File System	FSR/FSC
STD-CTMR-DVD-RAM	Import from File System Export to File System	FSR/FSC
STD-CTMR-DVD	Import from File System Export to File System	FSR/FSC
STD-GEN-DVD-JPEG	Import from File System Export to File System	FSR/FSC
STD-GEN-DVD-J2K	Import from File System Export to File System	FSR/FSC
STD-GEN-USB-JPEG	Import from File System Export to File System	FSR/FSC
STD-GEN-USB-J2K	Import from File System Export to File System	FSR/FSC
STD-GEN-MMC-JPEG	Import from File System Export to File System	FSR/FSC
STD-GEN-MMC-J2K	Import from File System Export to File System	FSR/FSC
STD-GEN-CF-JPEG	Import from File System Export to File System	FSR/FSC
STD-GEN-CF-J2K	Import from File System Export to File System	FSR/FSC
STD-GEN-SD-JPEG	Import from File System Export to File System	FSR/FSC
STD-GEN-SD-J2K	Import from File System Export to File System	FSR/FSC
STD-GEN-BD-JPEG	Import from File System Export to File System	FSR/FSC
STD-GEN-BD-J2K	Import from File System Export to File System	FSR/FSC

CD-related Application Profiles are supported as FSC in conjunction with a CD writing application and hardware.

DVD-related Application Profiles are supported as FSC in conjunction with a CD writing application and hardware.

DVD-RAM-related Application Profiles are supported as FSC in conjunction with a DVD-RAM writing application and hardware.

BD-related Application Profiles are supported as FSC in conjunction with a BD writing application and hardware.

5.2.1.1 File Meta Information for the Application Entity

The Source Application Entity Title included in the File Meta Header is not sent.

5.2.1.2 Real-World Activities

5.2.1.2.1 Activities – Import from File System and Export to File System

The Offline-Media Application Entity acts as an FSR when requested to import data from the file system.

The Offline-Media Application Entity acts as an FSC when requested to export data to the file system.

5.2.1.2.1.1 Media Storage Application Profiles

The Offline-Media Application Entity supports the Application Profiles listed in Table 28: Application Profiles, Activities and Roles for Offline-Media.

5.2.1.2.1.2 Options

The Offline-Media Application Entity supports the SOP Classes and Transfer Syntaxes listed in the Table below:

Table 29: IODs, SOP Classes and Transfer Syntaxes for Offline-Media

Abstract Syntaxes	Transfer Syntaxes
12-lead ECG Waveform Storage	Little Endian Implicit VR
Ambulatory ECG Waveform Storage	
Arterial Pulse Waveform Storage	Little Endian Explicit VR
Autorefracton Measurements Storage	
Basic Structured Display Storage	Deflated Little Endian Explicit VR
Basic Text SR	
Basic Voice Audio Waveform Storage	Lossless JPEG Image Compression
Blending Softcopy Presentation State Storage	
Breast Tomosynthesis Image Storage	Lossless JPEG Image Compression with first-order prediction
Cardiac Electrophysiology Waveform Storage	
Chest CAD SR	
Colon CAD SR	Lossless JPEG 2000 Image Compression
Color Softcopy Presentation State Storage	
Comprehensive SR	

Abstract Syntaxes

Transfer Syntaxes

Computed Radiography Image Storage

CT Image Storage

Deformable Spatial Registration Storage

Digital Intra-oral X-Ray Image Storage - For Presentation

Digital Intra-oral X-Ray Image Storage - For Processing

Digital Mammography Image Storage - For Presentation

Digital Mammography Image Storage - For Processing

Digital X-Ray Image Storage - For Presentation

Digital X-Ray Image Storage - For Processing

Encapsulated CDA Storage

Encapsulated PDF Storage

Enhanced CT Image Storage

Enhanced MR Color Image Storage

Enhanced MR Image Storage

Enhanced PET Image Storage

Enhanced SR

Enhanced US Volume Storage

Enhanced XA Image Storage

Enhanced XRF Image Storage

General Audio Waveform Storage

General ECG Waveform Storage

Generic Implant Template Storage

Grayscale Softcopy Presentation State Storage

Hemodynamic Waveform Storage

Implant Assembly Template Storage

Implant Template Group Storage

Implantation Plan SR Document Storage

Intraocular Lens Calculations Storage

Intravascular Optical Coherence Tomography Image Storage - For Presentation

Intravascular Optical Coherence Tomography Image Storage - For Processing

Keratometry Measurements Storage

Key Object Selection

Lensometry Measurements Storage

Macular Grid Thickness and Volume Report

Mammography CAD SR

MR Image Storage

MR Spectroscopy Storage

Multi-frame Grayscale Byte Secondary Capture Image Storage

Multi-frame Grayscale Word Secondary Capture Image Storage

Multi-frame Single Bit Secondary Capture Image Storage

Lossy JPEG 2000 Image Compression

Lossy JPEG Baseline Image Compression

Lossy JPEG Extended Image Compression

Abstract Syntaxes

Transfer Syntaxes

- Multi-frame True Color Secondary Capture Image Storage
- Nuclear Medicine Image Storage
- Ophthalmic Axial Measurements Storage
- Ophthalmic Photography 16 Bit Image Storage
- Ophthalmic Photography 8 Bit Image Storage
- Ophthalmic Tomography Image Storage
- Ophthalmic Visual Field Static Perimetry Measurements Storage
- Positron Emission Tomography Image Storage
- Procedure Log
- Pseudo-Color Softcopy Presentation State Storage
- Raw Data Storage
- Real World Value Mapping Storage
- Respiratory Waveform Storage
- RT Beams Delivery Instruction Storage
- RT Beams Treatment Record Storage
- RT Brachy Treatment Record Storage
- RT Dose Storage
- RT Image Storage
- RT Ion Beams Treatment Record Storage
- RT Ion Plan Storage
- RT Plan Storage
- RT Structure Set Storage
- RT Treatment Summary Record Storage
- Secondary Capture Image Storage
- Segmentation Storage
- Spatial Fiducials Storage
- Spatial Registration Storage
- Spectacle Prescription Report Storage
- Stereometric Relationship Storage
- Subjective Refraction Measurements Storage
- Surface Segmentation Storage
- Ultrasound Image Storage
- Ultrasound Multi-frame Image Storage
- Video Endoscopic Image Storage
- Video Microscopic Image Storage
- Video Photographic Image Storage
- Visual Acuity Measurements Storage
- VL Endoscopic Image Storage
- VL Microscopic Image Storage
- VL Photographic Image Storage
- VL Slide-Coordinates Microscopic Image Storage
- VL Whole Slide Microscopy Image Storage
- X-Ray 3D Angiographic Image Storage
- X-Ray 3D Craniofacial Image Storage

Abstract Syntaxes

Transfer Syntaxes

- X-Ray Angiographic Image Storage
- X-Ray Radiation Dose SR
- X-Ray Radiofluoroscopic Image Storage
- XA/XRF Grayscale Softcopy Presentation State Storage

5.3 Augmented and Private Application Profiles

Mirada DBx does not support any augmented or private application profiles.

6 Support of Character Sets

All Mirada DBx DICOM applications support:

Character set

- UTF-8
- ISO_IR 6
- ISO_IR 13
- ISO_IR 87
- ISO_IR 100
- ISO_IR 101
- ISO_IR 109
- ISO_IR 110
- ISO_IR 126
- ISO_IR 127
- ISO_IR 138
- ISO_IR 144
- ISO_IR 148
- ISO_IR 159
- ISO_IR 166
- GB18030

7 Security

7.1 Security Profiles

DBx supports Security Profiles as defined in the following table:

Table 30: Supported Security Profiles

<u>Security Profiles Supported</u>
<u>Basic TLS Secure Transport Connection</u>
<u>AES TLS Secure Transport Connection</u>

The port on which DBx accepts secure connections is configurable and defaults to 2762.

8 Basic Application Level Confidentiality Profile

DBx offers the ability to anonymize DICOM data with the Anonymizer tool. The Anonymizer supports the Basic Application Level Confidentiality Profile as De-Identifier. If you have the Anonymizer tool see the following document for details of which tags are changed by the anonymization process:

mm4667-1.2-0 DBx Utilities - Tag Anonymization Descriptions.