# DICOM® 3
# Conformance Statement **

***Applicable to MIM software versions 7.4.x***

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# *1 Revision History*

| Issue Date: | Prepared by: | Description of Change: |
|---|---|---|
| 5/05/2003 | P. Simmelink | Initial Release |
| 4/19/2004 | P. Simmelink | Update for new rev of DICOM |
| 8/15/2005 | D. Watson | Update for new rev of DICOM |
| 7/26/2006 | D. Watson | Update for new rev of DICOM |
| 3/15/2007 | M. Cain | Update for new rev of DICOM |
| 5/08/2008 | D. Watson | Update for new rev of DICOM |
| 11/05/2010 | C. Vincent | Changed company name, added SOP classes, misc. fixes to bring in line with current standard. |
| 11/23/2010 | L. Hanigan | Modified to use correct logos. |
| 12/01/2010 | C. Vincent | Added conformance for Plan to SOP Classes as an SCU. |
| 6/29/2011 | L. Hanigan | Changed Introduction to add MIMviewer import/export capabilities. (import: RT Struct, Dose, Plan, and Reg – export: of secondary captures) |
| 10/14/2013 | L. Hanigan | Modified for address change |
| 12/19/2013 | P. Jacobs | Added Raw Data Storage SOP Class UID 1.2.840.10008.5.1.4.1.1.66 to both tables in section 7.1.<br>Mention in section 7.1.2.14 that Explicit Transfer syntax is not supported for the following modalities: RT Dose Storage, RT Structure Set Storage, and RT Plan Storage. |
| 02/24/2015 | L. Hanigan | Add versioning to correspond to applicable MIM and MIMviewer versions. |
| 04/17/2015 | D. Watson | Revised in accordance with new DICOM standard for Conformance Statements. Added Image-Level query as SCP and C-GET as SCU. |
| 05/18/2016 | L. Hanigan | Updated versioning to correspond to applicable MIM and MIMviewer versions. Removed the JSON reference in Section 8 |
| 05/31/2017 | M. Lukas | Revised for MIM 6.7/MIMviewer 3.7 to add Unified |

| Issue Date: | Prepared by: | Description of Change: |
|---|---|---|
| | | Procedure Step (Pull Model) Support as SCU. |
| 09/18/2017 | J. Joss /<br>L. Hanigan | Made sure that all grammar was addressed and changed revision date. |
| 04/10/2018 | S. Thompson | Updated title page for MIM 6.8, MIMviewer 3.8 and updated the copyright. |
| 11/05/2018 | S. Thompson | Updated title page for MIM 6.9 and MIMviewer 3.9. |
| 10/15/2019 | S. Thompson | Updated title page for MIM 7.0 and MIMviewer 4.0. |
| 10/7/2020 | S. Webster | Updated title page for MIM 7.1 and copyright for 2020. MIMviewer version was not updated as it has been obsoleted in MIM 7.1. |
| 12/15/2020 | S. Webster | Updated the title page to change 6.7 to 6.8 as MIM 6.7 is no longer supported. Changed MIM 7.1 to MIM 7.0.2 as subsequent revision will be made for MIM 7.0.3 and up. Removed references to MIMviewer due to support ending on 12/31/2020. |
| 12/15/2020 | D. Parvin | Updated title page to specify MIM 7.0.3 and higher. Updated Section 7.2.3.2.6.1.4, “Dataset Specific Conformance for Patient Root QR and Study Root QR Information Models.” |
| 10/11/2021 | S. Webster | Updated the title page to change MIM 7.1.x to MIM 7.2.x following the release of MIM 7.2. Updated the copyright year to 2021. |
| 11/14/2022 | H. Richmond | Updated the title page to change MIM 7.2.x to MIM 7.3.x following the release of MIM 7.3. Updated the copyright year to 2022. Updated list of supported SOP Classes. Revised Functional Definitions of AEs. Expanded list of Networking Parameters. Statement added the disclaimer regarding compliance with the ACR-NEMA DICOM 3 standard (Version 2022c). |
| 1/16/2024 | H. Richmond /<br>S. Webster | Clarified read/write support for supported character sets. Updated copyright year to 2024. Updated title page for MIM 7.4. |

## 2 Copyright Statement

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## 3 Disclaimer

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Additionally, while developing MIM software, care has been taken to ensure compliance with the ACR-NEMA DICOM 3 standard (Version 2022c), however, due to the inherent nature of DICOM, the user must perform acceptance testing to verify that MIM DICOM software meets the requirements for their given configuration. The acceptance testing must include all representative datasets (images) intended for transfer, all types of transfers desired for a type of dataset, and clinical evaluation of each representative dataset on the receiving end after each desired type of transfer.

# *4 Conformance Statement Overview*

MIM supports multiple types of DICOM networking and on-disk media storage. As a Client (SCU), MIM can store, query, retrieve, and print to other DICOM entities. As a Server (SCP), it can accept and process Store, Query, and Retrieve requests.

The software can store many diverse types of DICOM media on-disk, including CT, PET, MR, Nuclear Medicine, X-Ray, Structured Reports, Encapsulated Documents (including PDF), and a variety of types of DICOM RT data.

MIM command line arguments also allow it to pull Unified Procedure Steps (UPS) from a UPS SCP which can map to a sequence of MIM commands, collectively called a 'MIM Workflow,' which guide the user through performing the procedure defined by the UPS, including operations which update the UPS and change its state.

The following table lists the default configuration and which of the SOP classes may be used as SCU and SCP. Additional Transfer SOP classes can be configured as SCP.

| SOP Classes | User of Service (SCU) | Provider of Service (SCP) |
|---|---|---|
| **Transfer** | | |
| Verification SOP Class | Yes | Yes |
| 12-lead ECG Waveform Storage | Yes | Yes |
| 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 Structured Display Storage | Yes | Yes |
| Basic Study Content Notification SOP Class (Retired) | Yes | Yes |
| Basic Text SR Storage | 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 Storage | Yes | Yes |

| SOP Classes | User of Service (SCU) | Provider of Service (SCP) |
|---|---|---|
| Colon CAD SR Storage | Yes | Yes |
| Color Palette Storage | Yes | Yes |
| Color Softcopy Presentation State Storage | 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 X-Ray Image Storage - For Presentation | Yes | Yes |
| DICOS Digital X-Ray Image Storage - For Processing | Yes | Yes |
| DICOS Threat Detection Report 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 X-Ray Image Storage - For Presentation | Yes | Yes |
| Digital Mammography X-Ray Image Storage - For Processing | Yes | Yes |
| Digital X-Ray Image Storage - For Presentation | Yes | Yes |
| Digital X-Ray 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 |

| SOP Classes | User of Service (SCU) | Provider of Service (SCP) |
|---|---|---|
| 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 |
| Hanging Protocol Storage | Yes | Yes |
| Hardcopy Color Image Storage SOP Class (Retired) | Yes | Yes |
| Hardcopy Grayscale Image Storage SOP Class (Retired) | Yes | Yes |
| Hemodynamic Waveform Storage | Yes | Yes |
| Implant Assembly Template Storage | Yes | Yes |
| Implant Template Group Storage | 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 |
| Media Storage Directory 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 True Color Secondary Capture Image Storage | Yes | Yes |

| SOP Classes | User of Service (SCU) | Provider of Service (SCP) |
|---|---|---|
| Nuclear Medicine Image Storage | Yes | Yes |
| Nuclear Medicine Image Storage (Retired) | 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 |
| Philips Private MR Series Data Storage | Yes | Yes |
| Positron Emission Tomography Image Storage | Yes | Yes |
| Procedure Log Storage | Yes | Yes |
| Pseudo-Color Softcopy Presentation State Storage | Yes | Yes |
| Raw Data Storage | Yes | Yes |
| Real World Value Mapping Storage | Yes | Yes |
| Respiratory Waveform Storage | Yes | Yes |
| RT Beams Delivery Instruction Storage | Yes | Yes |
| RT Beams Delivery Instruction Storage (Retired) | 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 Plan Varian 1 Storage | Yes | Yes |
| RT Structure Set Storage | Yes | Yes |
| RT Treatment Record Varian 1 Storage | Yes | Yes |
| RT Treatment Summary Record Storage | Yes | Yes |
| Secondary Capture Image Storage | Yes | Yes |
| Segmentation Storage | Yes | Yes |

| SOP Classes | User of Service (SCU) | Provider of Service (SCP) |
|---|---|---|
| Siemens CSA Non-Image Storage | 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 VOI LUT 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 |
| Toshiba US Private Data Storage | Yes | Yes |
| Ultrasound Image Storage | Yes | Yes |
| Ultrasound Image Storage (Retired) | Yes | Yes |
| Ultrasound Multi-frame Image Storage | Yes | Yes |
| Ultrasound Multi-frame Image Storage (Retired) | 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 - Trial (Retired) | Yes | Yes |
| VL Microscopic Image Storage | Yes | Yes |
| VL Multi-frame Image Storage - Trial (Retired) | Yes | Yes |
| VL Photographic Image Storage | Yes | Yes |
| VL Slide-Coordinates Microscopic Image Storage | Yes | Yes |

| SOP Classes | User of Service (SCU) | Provider of Service (SCP) |
|---|---|---|
| VL Whole Slide Microscopy Image Storage | Yes | Yes |
| Waveform Storage - Trial (Retired) | Yes | Yes |
| X Ray 3D Angiographic Image Storage | Yes | Yes |
| X Ray 3D Craniofacial Image Storage | Yes | Yes |
| XA/XRF Grayscale Softcopy Presentation State Storage | Yes | Yes |
| X-Ray Angiographic Bi-Plane 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 |
| **Query/Retrieve** | | |
| Patient Root Query/Retrieve Information Model - FIND | No | Yes |
| Patient Root Query/Retrieve Information Model - MOVE | No | 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 | Yes | Yes |
| **Workflow Management** | | |
| Unified Procedure Step - Pull SOP Class | Yes | No |
| **Print Management** | | |
| Basic Grayscale Print Management | Yes | No |
| Basic Color Print Management | Yes | No |
| Basic Film Session | Yes | No |
| Basic Film Box | Yes | No |
| Basic Grayscale Image Box | Yes | No |
| Basic Color Image Box | Yes | No |
| Print Job | Yes | No |
| Printer | Yes | No |

# 5 Table of Contents

# 6 Introduction

The MIM software application is used for the registration, fusion, and display of medical images from multi-modalities. It also uses the file system as storage for the DICOM image files.

MIM supports the import of CT, MR, PT, NM, CR, US, and Secondary Capture images as well as RT Structure Sets, Dose, Plan, and Registration objects.

MIM supports the creation of Secondary Capture images and is capable of creating CT, MR, PT, NM, CR, and US images as well as RT Structure Sets, Dose, Plan, and Registration objects.

DICOM Server and Device configuration can be done through the MIM application. The MIM DICOM Store SCP can be installed/uninstalled and started/stopped, and additional DICOM devices can be entered and configured in order to communicate with MIM.

MIM also supports DICOM Printing as an SCU, with support for both Grayscale and Color printing.

MIM supports DICOM Query/Retrieve as an SCU and SCP.

## 6.1 Audience

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

## 6.2 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between MIM 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 should not 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.

MIM Software has participated in an industry-wide testing program sponsored by Integrating the Healthcare Enterprise (IHE). The IHE Integration Statement for MIM, together with the IHE Technical Framework, may facilitate the process of validation testing.

## *6.3 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**: the 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. Example: 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 the exchange of DICOM information objects and messages. Examples: JPEG compressed (images), little endian explicit value representation.

**Unified Procedure Step (UPS)**: The Unified Procedure Step Service Class provides for management of simple worklists, including creating new worklist items, querying the worklist, and communicating progress and results.

**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.

## *6.4 Basics of DICOM Communications*

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted 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.

## *6.5 Abbreviations*

| | |
|---|---|
| **AE** | Application Entity |
| **AET** | Application Entity Title |
| **CD-R** | Compact Disk Recordable |
| **CLI** | Command Line Interface |
| **CSE** | Clinical Support Engineer |

| | |
|---|---|
| **CR** | Computed Radiography |
| **CT** | Computed Tomography |
| **DHCP** | Dynamic Host Configuration Protocol |
| **DICOM** | Digital Imaging and Communications in Medicine |
| **DN** | Distinguished Name (LDAP) |
| **DNS** | Domain Name System |
| **DX** | Digital X-ray |
| **IHE** | Integrating the Healthcare Enterprise |
| **IOD** | Information Object Definition |
| **IPv4** | Internet Protocol version 4 |
| **IPv6** | Internet Protocol version 6 |
| **ISO** | International Organization for Standards |
| **JPEG** | Joint Photographic Experts Group |
| **LDAP** | Lightweight Directory Access Protocol |
| **LDIF** | LDAP Data Interchange Format |
| **LUT** | Look-up Table |
| **MG** | Mammography (X-ray) |
| **MR** | Magnetic Resonance Imaging |
| **MTU** | Maximum Transmission Unit (IP) |
| **NM** | Nuclear Medicine |
| **OP** | Ophthalmic Photography |
| **OSI** | Open Systems Interconnection |
| **PACS** | Picture Archiving and Communication System |
| **PET** | Positron Emission Tomography |
| **PDU** | Protocol Data Unit |
| **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 |
| **UL** | Upper Layer |
| **UPS** | Unified Procedure Step |
| **US** | Ultrasound |
| **VR** | Value Representation |
| **XA** | X-ray Angiography |

## *6.6 References*

User Guides for MIM are available upon request.

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

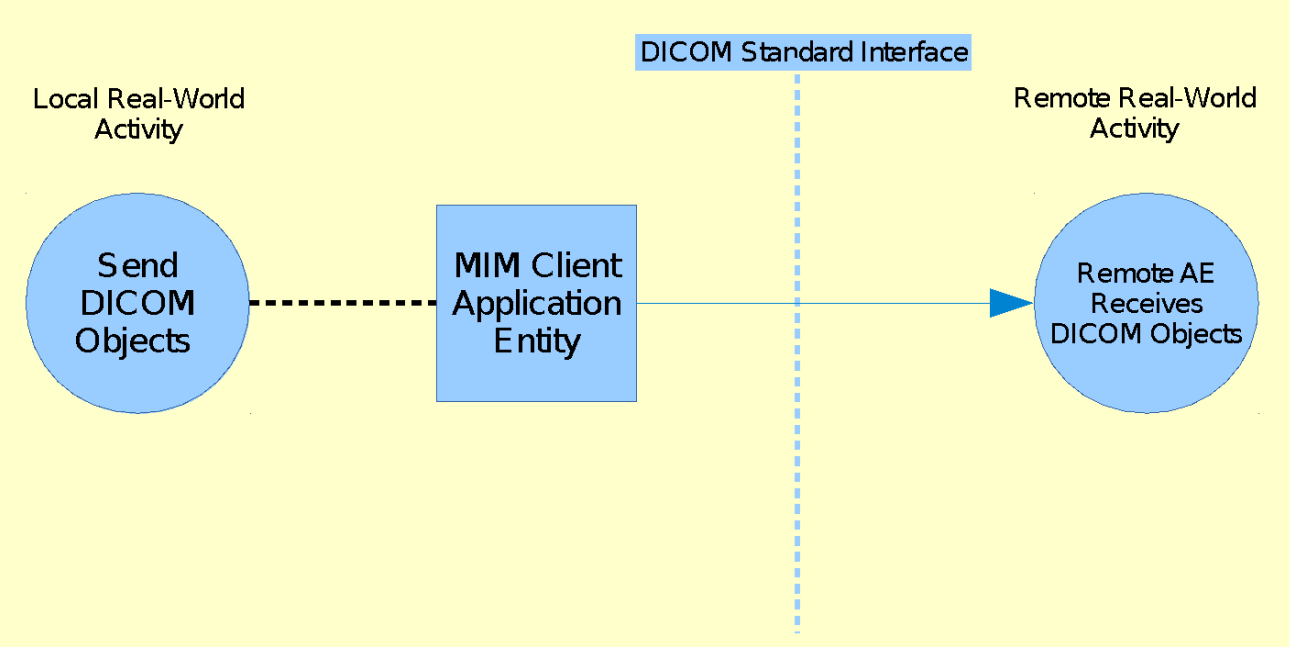
# 7 Networking

## 7.1 Implementation Model

The Implementation model consists of three sections: the Application Data Flow Diagram, specifying the relationship between the Application Entities and the "external world" or Real-World activities, a functional description of each Application Entity, and the sequencing constraints among them.

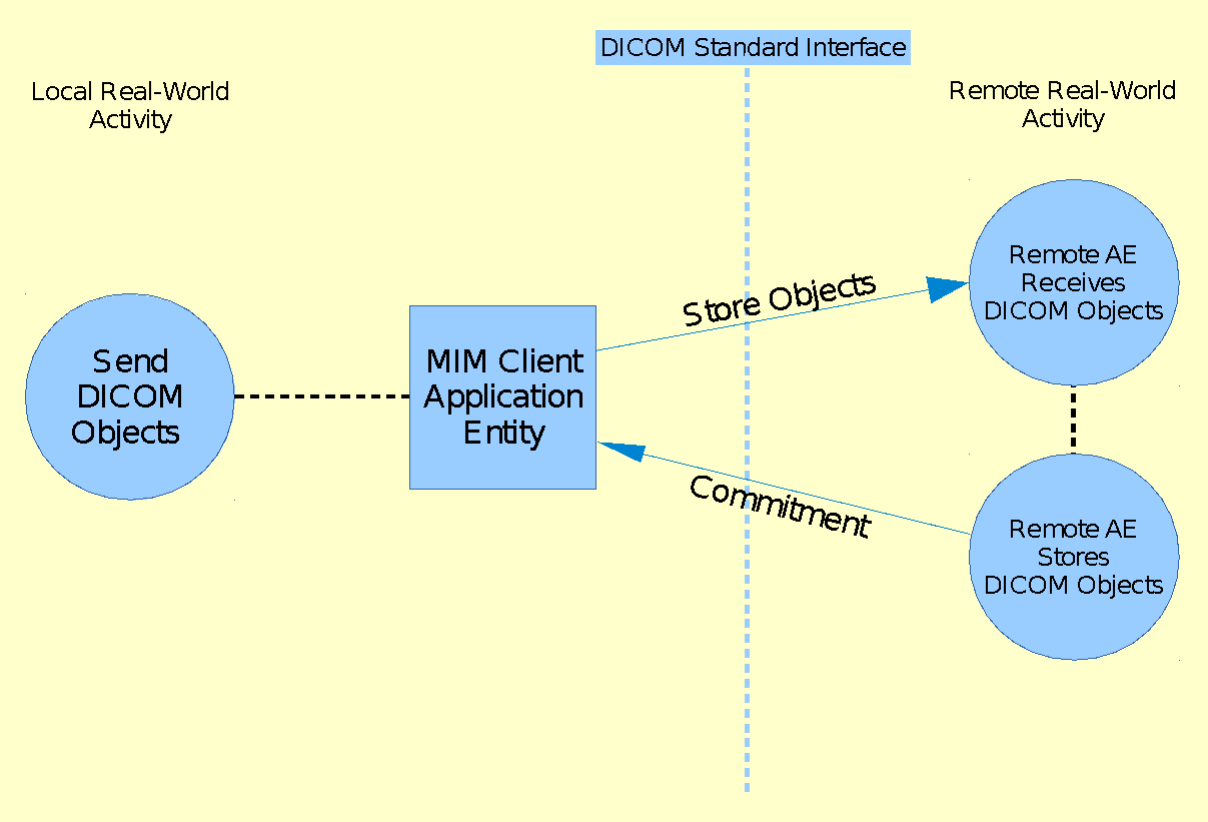
### 7.1.1 Application Data Flow

#### 7.1.1.1 Application Data Flow – Store (SCU)




The MIM Client AE or MIM Assistant AE sends DICOM objects to a remote AE. This activity is initiated either by user action in the MIM Client application or by an automated process in the MIM Assistant service.

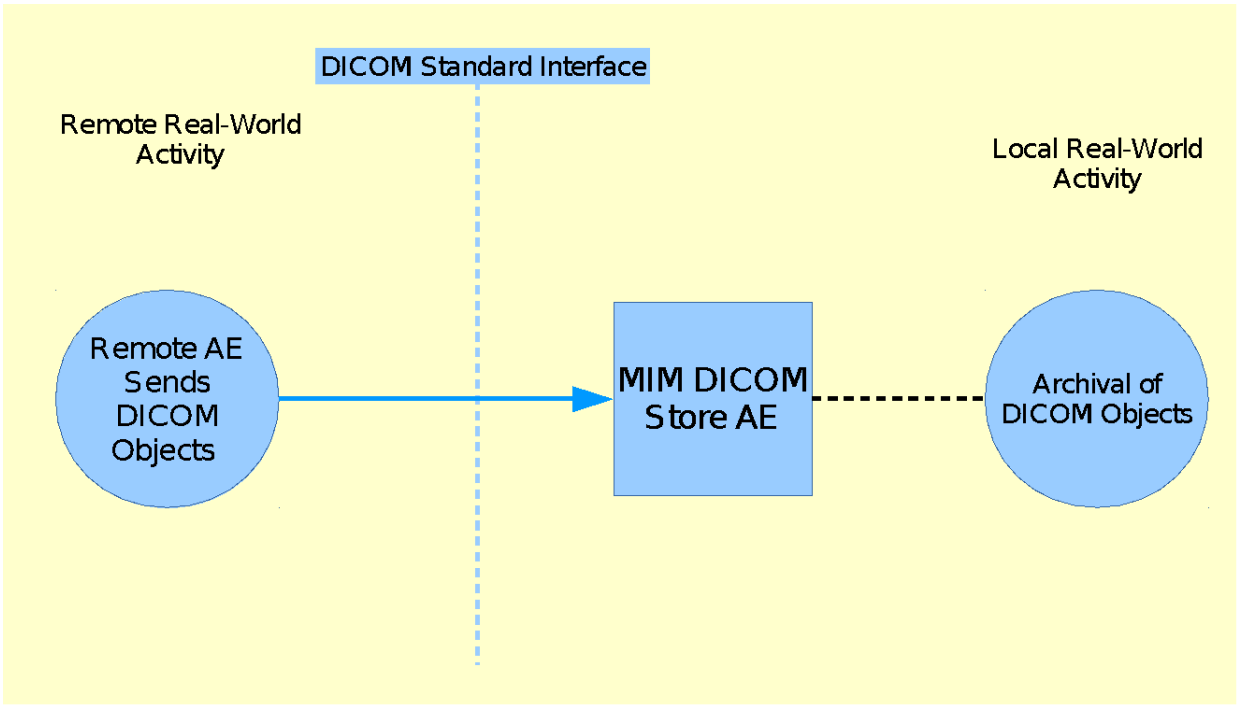
### *7.1.1.2 Application Data Flow – Store with Commit (SCU)*




The MIM Client AE or MIM Assistant AE sends DICOM objects to a remote AE that is configured to use Storage Commitment. This activity is initiated either by user action in the MIM Client application or by an automated process in the MIM Assistant service.

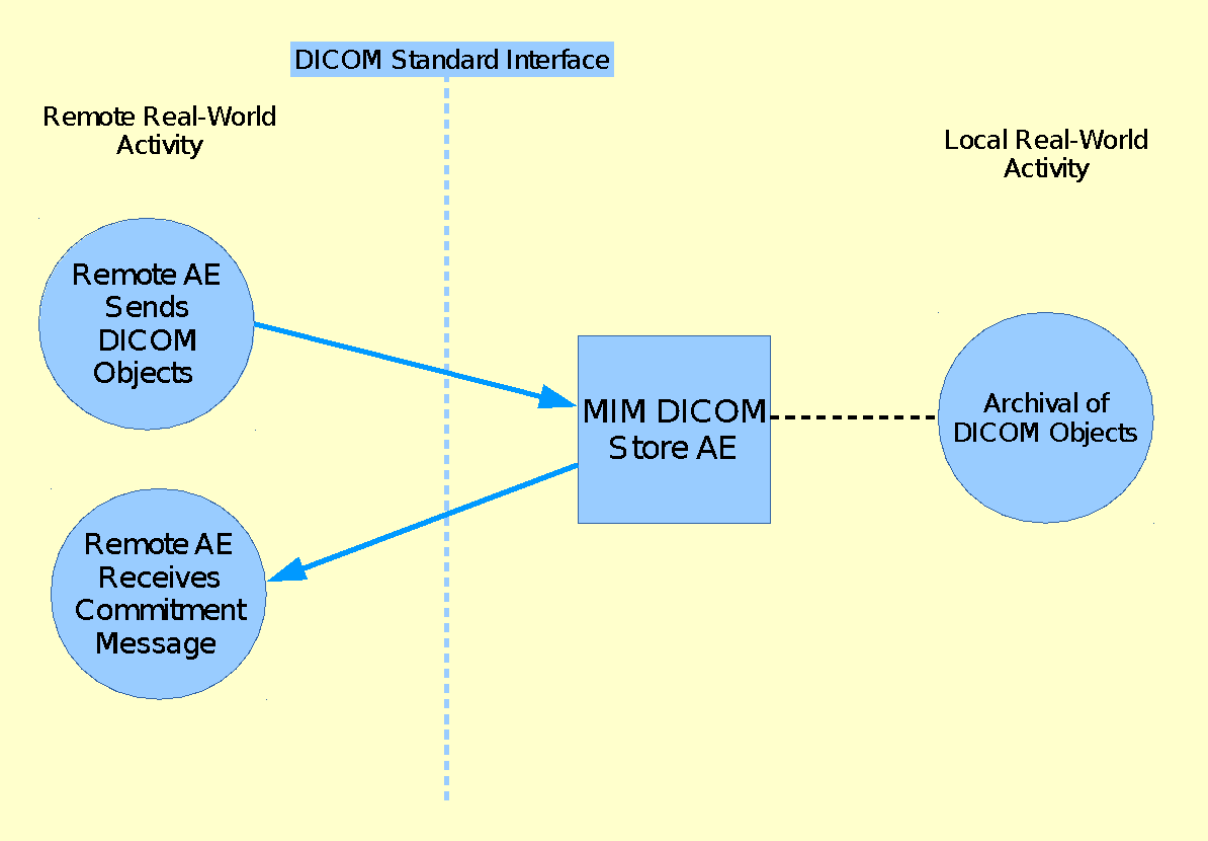
Once the remote AE receives and permanently stores the DICOM objects, it sends a commitment message back to the MIM AE.

#### *7.1.1.3 Application Data Flow – Store (SCP)*




A remote AE sends DICOM objects to the MIM DICOM Store AE. When the MIM DICOM Store AE receives them, they are stored to the location that is configured based on the AE title that the MIM AE receives them on.

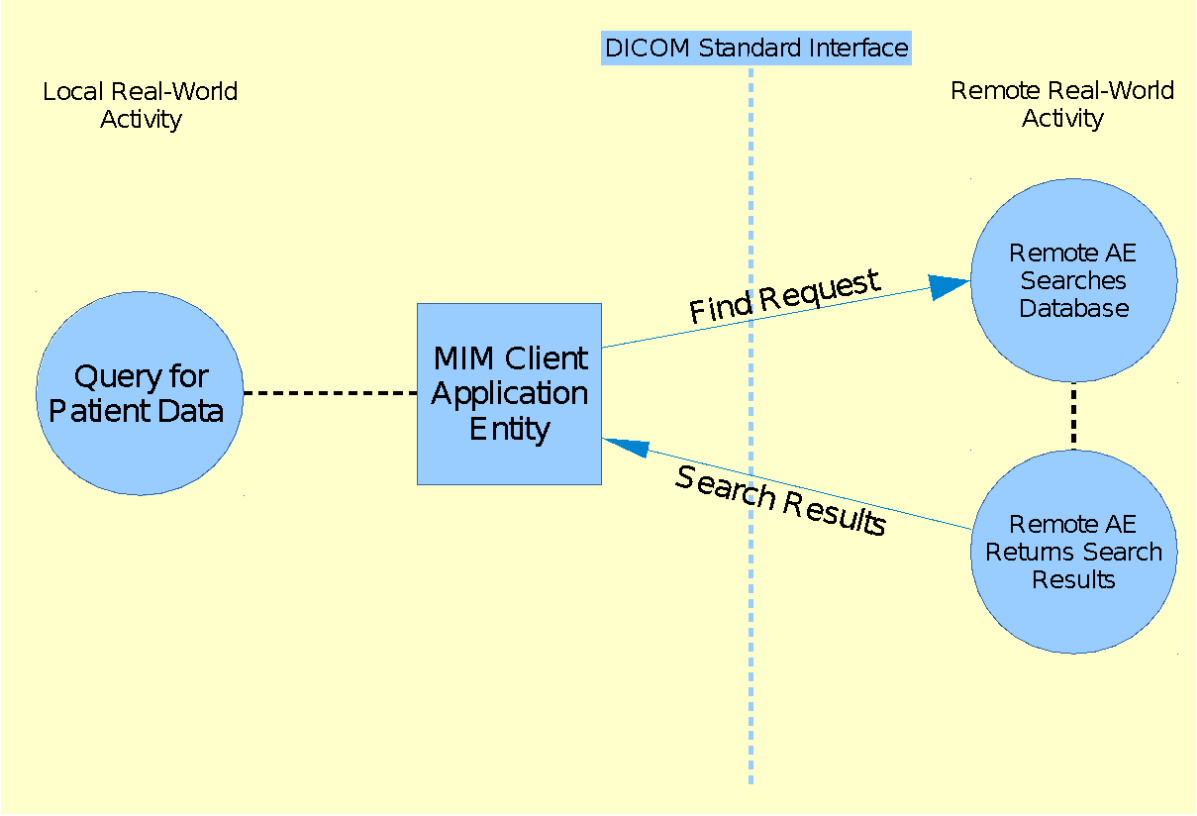
#### *7.1.1.4 Application Data Flow – Store with Commit (SCP)*




A remote AE sends DICOM objects to the MIM DICOM Store AE and requests Storage Commitment. When the MIM DICOM Store AE receives them, they are stored to the MIM archive location that is configured based on the AE title that the MIM AE receives them on. Once they have been archived, the MIM DICOM Store AE send the remote AE the Storage Commitment message.

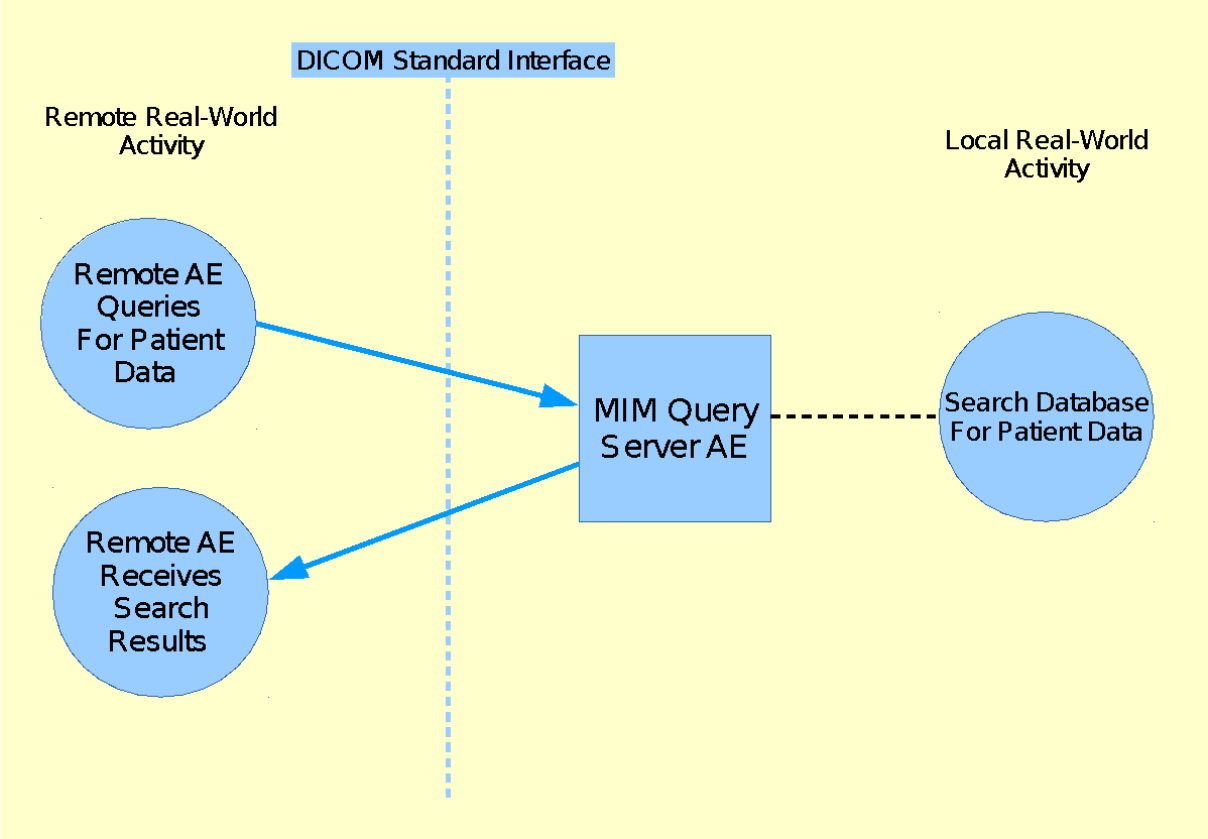
By default, the MIM DICOM Store AE does not support storage commitment; this must be enabled through a configuration option.

#### *7.1.1.5 Application Data Flow – Query with C-FIND (SCU)*



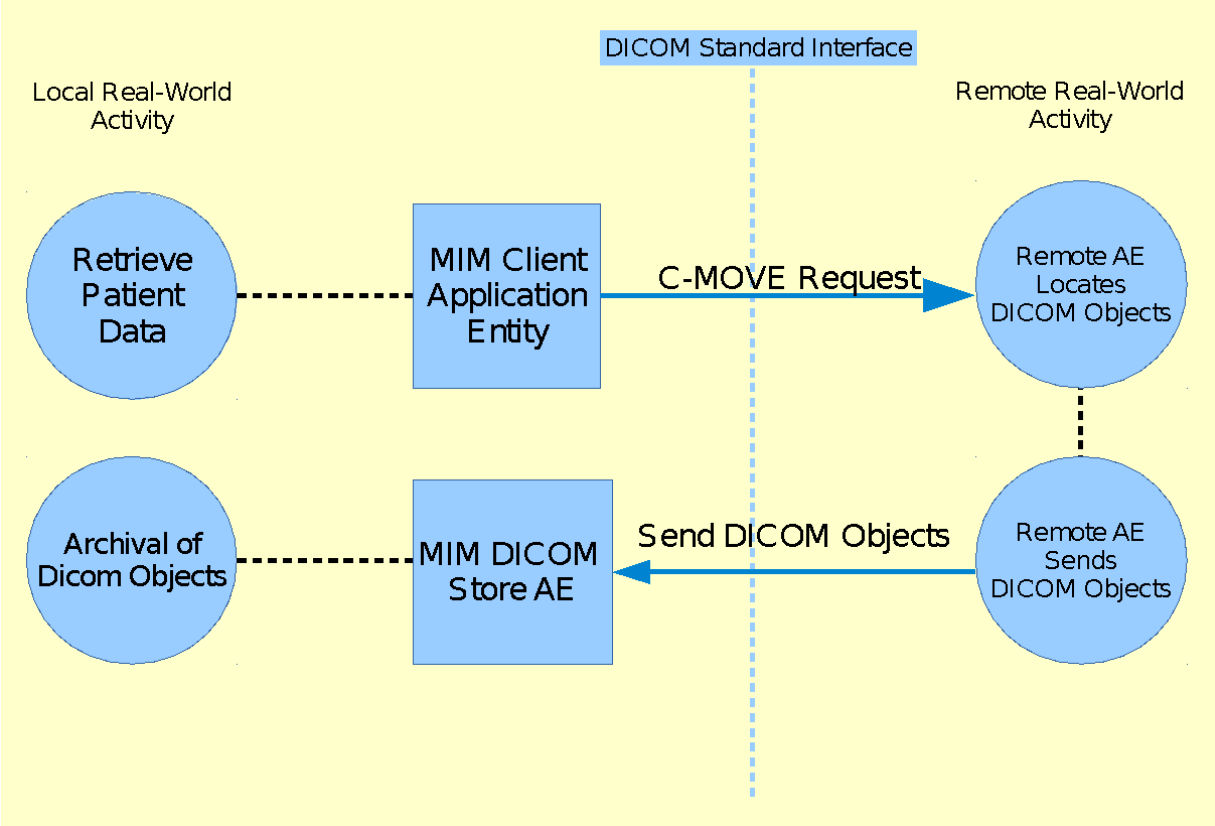

The MIM Client AE or MIM Assistant AE queries a remote AE for patient data. This activity is initiated either by user action in the MIM Client application or by an automated process in the MIM Assistant service. The remote AE searches its database and returns the search results to the MIM AE. These results are then either shown on the screen or used to perform some further processing, generally resulting in either additional C-FIND commands (to narrow the search results) or C-MOVE or C-GET to retrieve the data.

#### *7.1.1.6 Application Data Flow – Query with C-FIND (SCP)*



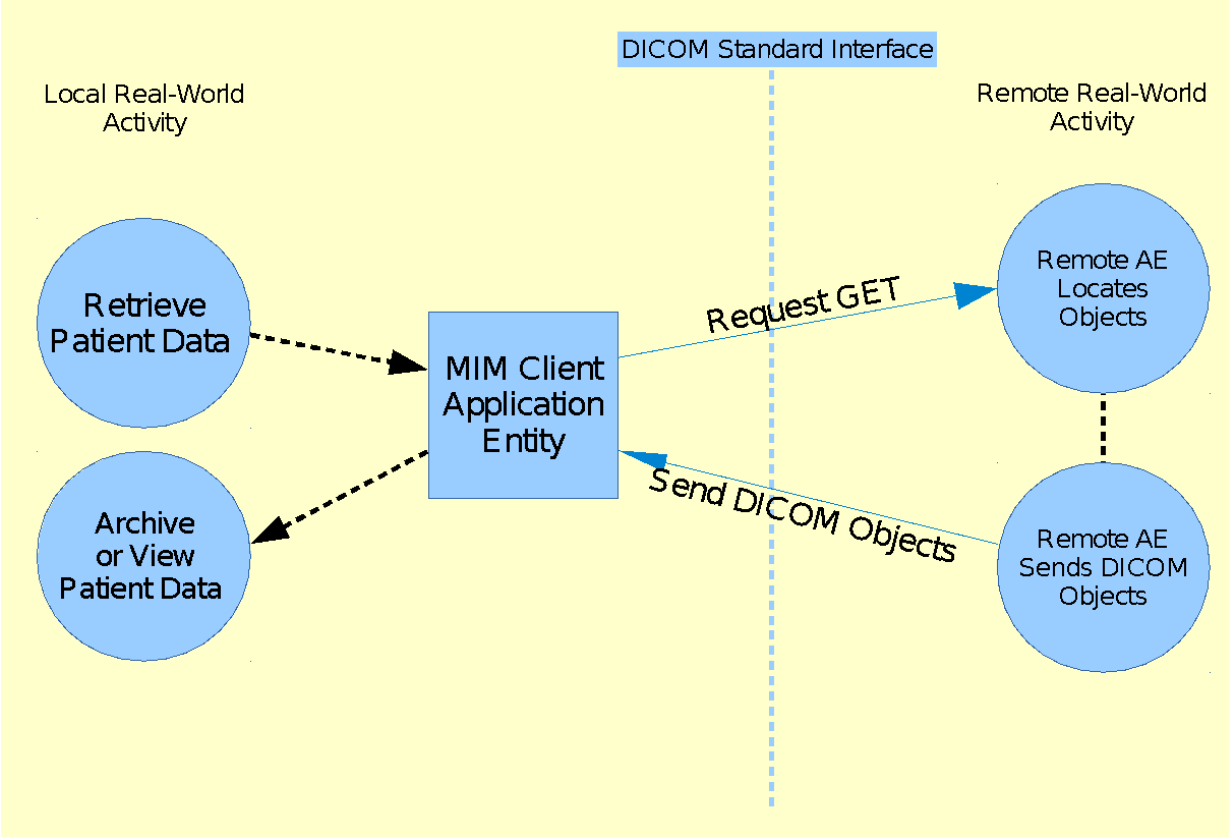

A remote AE queries the MIM Query Server AE for patient data. The MIM Query Server AE searches its database and returns the search results to the remote AE.

### *7.1.1.7 Application Data Flow – Retrieve with C-MOVE (SCU)*



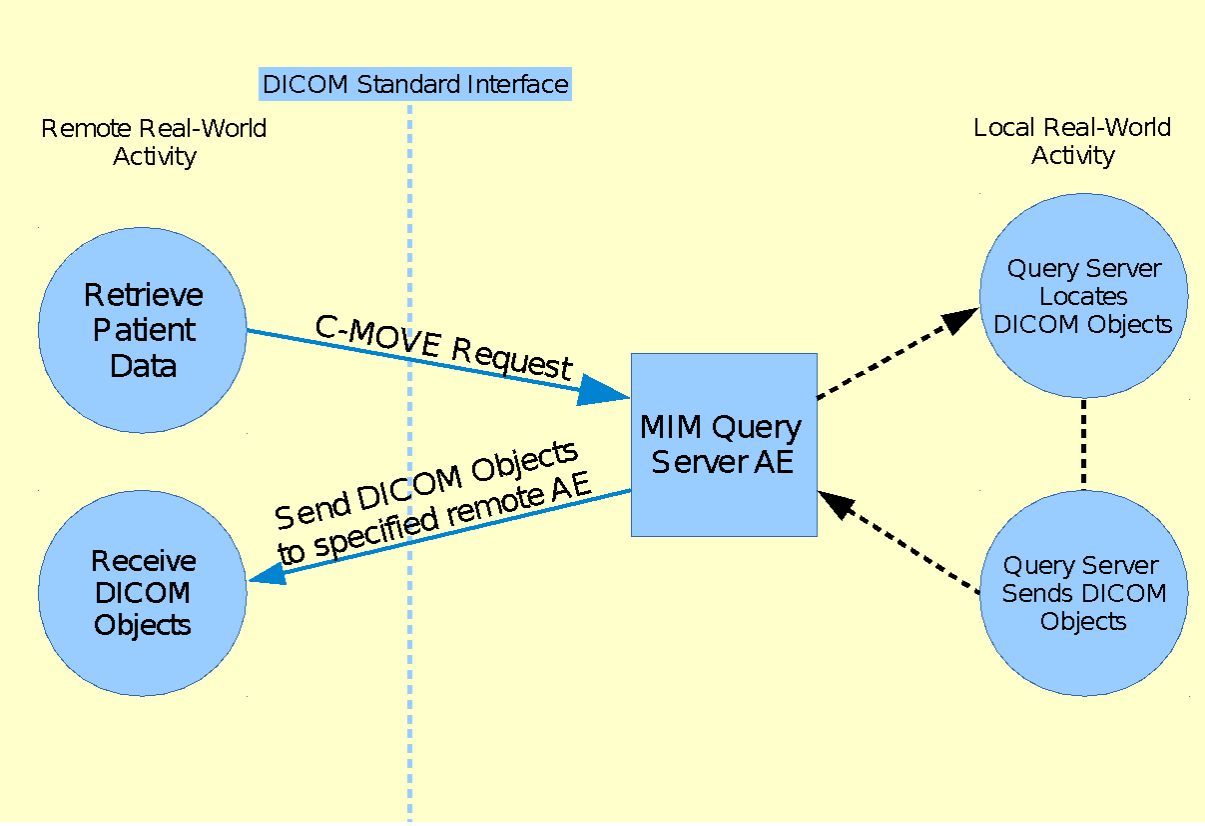

After performing a C-FIND operation, either the user (using the MIM Client Application) or an automated process (in the MIM Assistant) initiates a retrieval operation. The MIM AE sends a C-MOVE request for the data in question, along with the AE title of the DICOM Store AE it is being retrieved to. The remote AE locates the objects in question, and then initiates a new association to the MIM DICOM Store AE either on the requesting machine or a different machine. The DICOM objects are then sent via C-STORE to the MIM DICOM Store AE, which archives them to make them available for further processing.

### *7.1.1.8 Application Data Flow – Query and Retrieve with C-GET (SCU)*



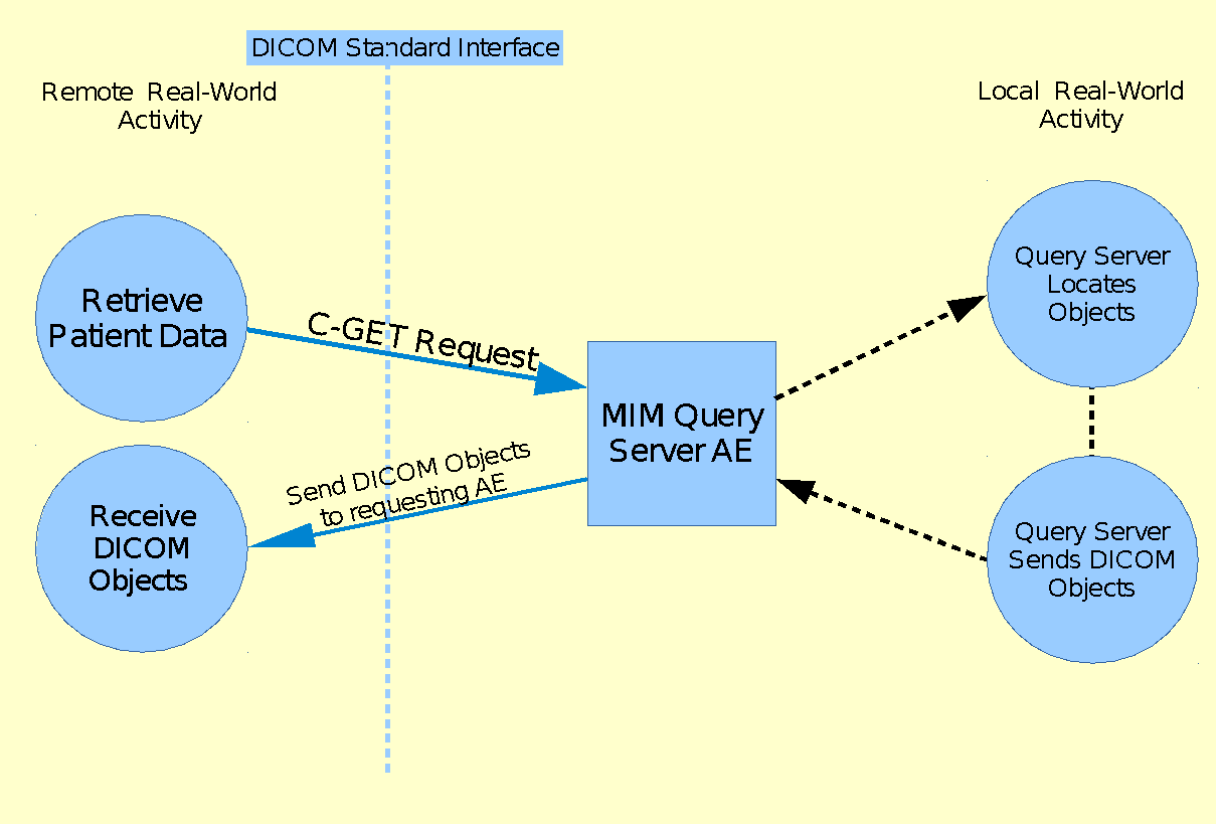

After performing a C-FIND operation, either the user (using the MIM Client Application) or an automated process (in the MIM Assistant) initiates a retrieval operation. The MIM AE sends a C-GET request for the data in question. The remote AE locates the objects in question, and then sends the requested objects on the same association. The DICOM objects are then shown on screen or archived to make them available for further processing.

### *7.1.1.9 Application Data Flow – Query and Retrieve with C-MOVE (SCP)*



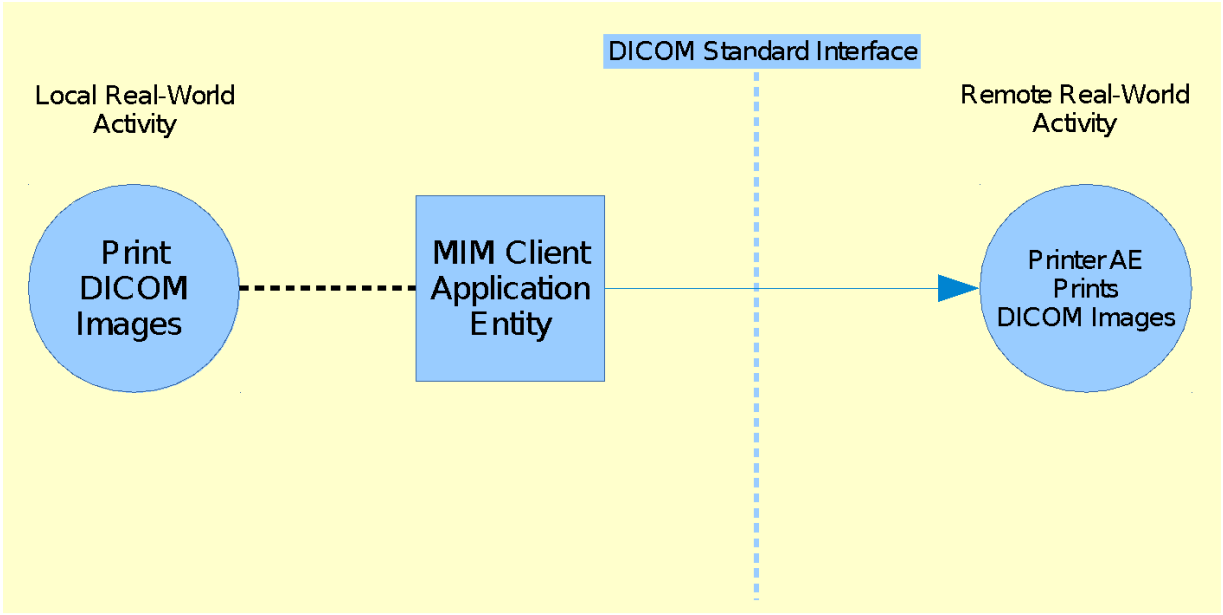

A remote AE initiates a retrieval operation for a specified set of DICOM objects, using a C-MOVE request specifying to which remote AE the data should be sent. The MIM Query Server AE locates the objects in question, and then initiates a new association to the specified remote AE either on the requesting machine or a different machine. The DICOM objects are then sent via C-STORE to the remote AE, which archives them or processes them in some other fashion.

### *7.1.1.10 Application Data Flow – Query and Retrieve with C-GET (SCP)*



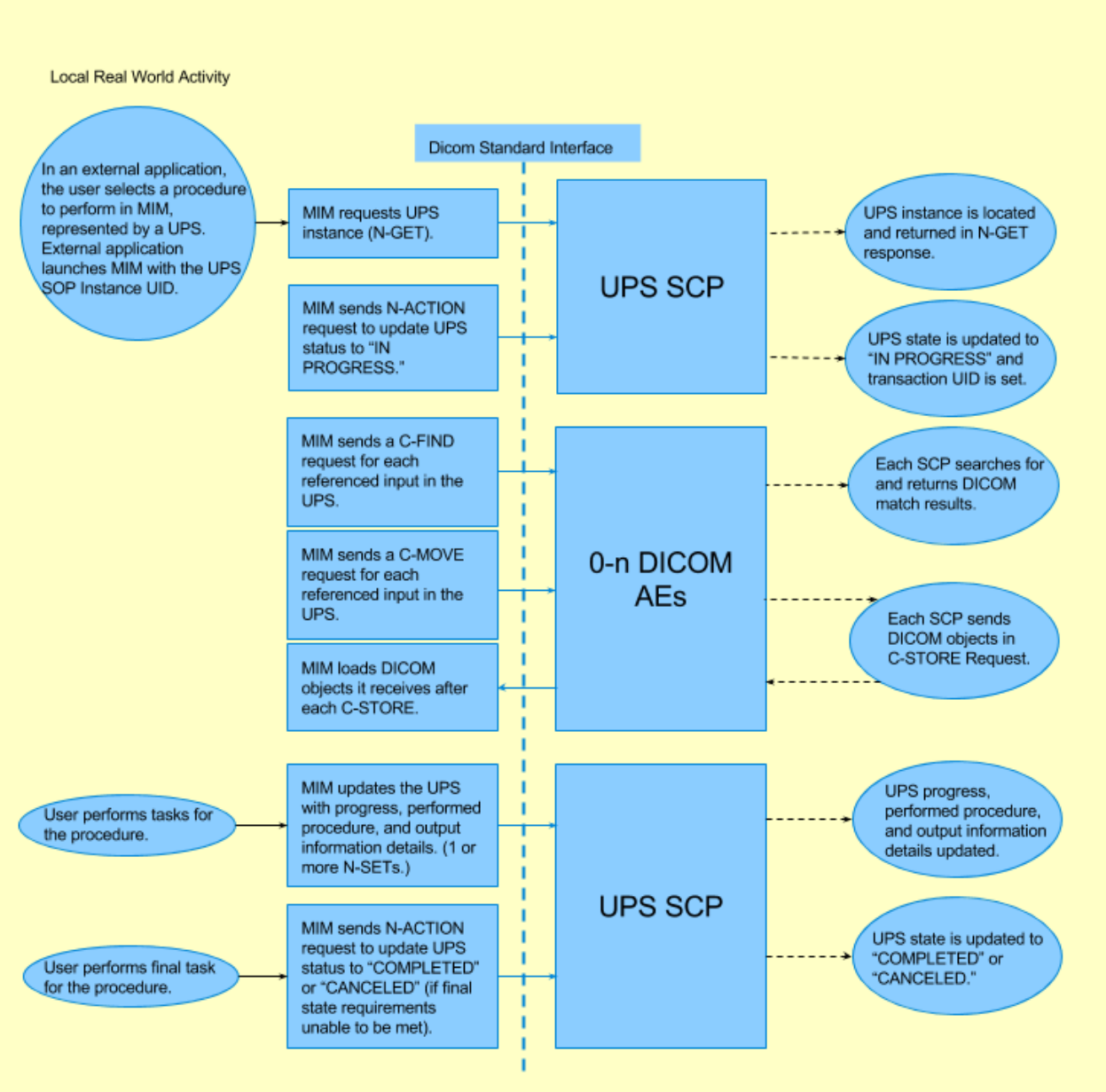

A remote AE initiates a retrieval operation for a specified set of DICOM objects, using a C-GET request. The MIM Query Server AE locates the objects in question. The DICOM objects are then sent via C-STORE to the remote AE, which archives them or processes them in some other fashion.

### *7.1.1.11 Application Data Flow – Print (SCU)*




A user initiates a DICOM Print operation in the MIM Client Application. The MIM AE creates a print job on the Printer AE and instructs it to print the specified DICOM images.

### *7.1.1.12 Application Data Flow – Performing a UPS Task (SCU)*




The user browses UPS work items listed in an external application and chooses a work item to be performed in MIM. The external application launches the MIM application using its CLI to identify the UPS representing the work item to be performed. The MIM AE takes ownership of the UPS on the UPS SCP and automatically walks the user through performing the procedure, informing the UPS SCP about progress updates, and completion/cancellation.

### *7.1.2 Functional Definitions of AEs*

MIM is made of several components which run independently of each other with each component having their own configuration.

#### *7.1.2.1 MIM Client AE*

The MIM Desktop client application acts as Storage SCU (supporting Storage Commit), Query/Retrieve SCU (supporting C-FIND, C-MOVE, and C-GET), Print SCU, and UPS SCU (supporting N-GET, N-ACTION, and N-SET).

#### *7.1.2.2 MIM Assistant AE*

The MIM Assistant can perform automatic background processing. Functionally, its DICOM networking components are the same as the MIM Desktop application. It can perform Storage and Query/Retrieve as an SCU and react to and process data received by the DICOM Store service.

#### *7.1.2.3 MIM DICOM Store Service AE*

The DICOM Store service acts as a Storage SCP and supports Storage Commit.

#### *7.1.2.4 MIM DICOM Query/Retrieve Service AE*

The DICOM Query/Retrieve service acts as a Query/Retrieve SCP (supporting C-FIND, C-MOVE, and C-GET) and Storage SCU (performing the MOVE operation initiated by a C-MOVE).

***Please Note:*** *as MIM has separate services (and thus Application Entities) for Query/Retrieve and Storage SCP, these must run on separate ports, and have their own AE Titles.*

### *7.1.3 Sequencing of Real-World Activities*

A sequence for use of all the MIM software systems for storage, query, and retrieval might consist of these steps:

1. Remote AE stores images to MIM DICOM Store AE.
2. MIM Assistant queries remote Query/Retrieve AE for prior images for that patient.
3. MIM Assistant AE requests C-MOVE or C-GET of additional images.
4. Remote Query/Retrieve AE sends images to MIM AE or MIM DICOM Store AE.
5. User views/processes images.
6. User prints DICOM images to remote Printer AE.
7. User creates Secondary Captures, Structured Reports, Encapsulated PDFs, or RT DICOM Objects.
8. User sends the created objects to a remote Storage AE, requesting Storage Commitment to ensure the data has been archived.
9. Another user on receiving remote AE sees the images that have been sent, and initiates Query/Retrieve operation back to the MIM Query/Retrieve AE to request additional images.
10. Remote AE initiates Retrieve operation, and MIM Query/Retrieve AE sends the additional images to the requesting remote AE.

A sequence for use of the MIM client AE as a UPS SCU might consist of these steps:

1. MIM will pull the UPS DICOM object from the SCP using an N-GET request, which includes:
    a. A list of input series to initially load to start the task.
    b. The DICOM AE title(s) at which each input series is located.
    c. An identifier MIM will use to match exactly one MIM Workflow to the UPS.
    d. (Optional) An AE title where any series should be saved that are created as a result of doing the task (e.g. RTstructs, SCs, etc.).
2. MIM will pull and load any input series using DICOM C-FIND and C-MOVE requests against each AE hosting input series (as specified in the UPS DICOM).
3. MIM will inform the UPS SCP that it is starting the UPS task by sending an N-ACTION request to change the UPS state to “IN PROGRESS.”
4. MIM will update the UPS SCP with information about the procedure start time and performing workstation using an N-SET request.
5. MIM will locate and launch a MIM Workflow (a sequence of internal application commands that will automatically be run for the user) matching the UPS task.
6. The MIM Workflow may contain commands to communicate progress periodically to the SCP via N-SET requests, as well as indicate the location of any series generated as a result of performing the workflow, and the AE title(s) at which they can be retrieved.
7. When the MIM Workflow is successfully completed, final state requirements such as the procedure end time will be set with an N-SET request, and the UPS will be changed to the “COMPLETED” state via an N-ACTION request.

## 7.2 AE Specifications

This section is a set of specifications for each of the Application Entities in the MIM software.

### 7.2.1 MIM Client AE / MIM Assistant AE

#### 7.2.1.1 SOP Classes

The MIM client application supports the following SOP classes for **Storage as an SCU**:

**Storage as an SCU** *(Table 1)*

| SOP Class Name | SOP Class UID |
|---|---|
| Verification SOP Class | 1.2.840.10008.1.1 |
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 |
| Arterial Pulse Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.5.1 |
| Audio SR Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.88.2 |
| Autorefraction Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.2 |
| Basic Structured Display Storage | 1.2.840.10008.5.1.4.1.1.131 |
| Basic Study Content Notification SOP Class (Retired) | 1.2.840.10008.1.9 |
| Basic Text SR Storage | 1.2.840.10008.5.1.4.1.1.88.11 |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 |
| Blending Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.4 |
| Breast Tomosynthesis Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.3 |
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 |
| Chest CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.65 |
| Colon CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.69 |
| Color Palette Storage | 1.2.840.10008.5.1.4.39.1 |
| Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.2 |
| Comprehensive SR Storage | 1.2.840.10008.5.1.4.1.1.88.33 |
| Comprehensive SR Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.88.4 |
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 |
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 |
| Deformable Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.3 |

| SOP Class Name | SOP Class UID |
|---|---|
| Detail SR Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.88.3 |
| DICOS CT Image Storage | 1.2.840.10008.5.1.4.1.1.501.1 |
| DICOS Digital X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.501.2.1 |
| DICOS Digital X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.501.2.2 |
| DICOS Threat Detection Report Storage | 1.2.840.10008.5.1.4.1.1.501.3 |
| Digital Intra-oral X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.3 |
| Digital Intra-oral X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.3.1 |
| Digital Mammography X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 |
| Digital Mammography X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 |
| Digital X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.1 |
| Digital X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.1.1 |
| Eddy Current Image Storage | 1.2.840.10008.5.1.4.1.1.601.1 |
| Eddy Current Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.601.2 |
| Encapsulated CDA Storage | 1.2.840.10008.5.1.4.1.1.104.2 |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 |
| Enhanced MR Color Image Storage | 1.2.840.10008.5.1.4.1.1.4.3 |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 |
| Enhanced PET Image Storage | 1.2.840.10008.5.1.4.1.1.130 |
| Enhanced SR Storage | 1.2.840.10008.5.1.4.1.1.88.22 |
| Enhanced US Volume Storage | 1.2.840.10008.5.1.4.1.1.6.2 |
| Enhanced XA Image Storage | 1.2.840.10008.5.1.4.1.1.12.1.1 |
| Enhanced XRF Image Storage | 1.2.840.10008.5.1.4.1.1.12.2.1 |
| General Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.2 |
| General ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.2 |
| Generic Implant Template Storage | 1.2.840.10008.5.1.4.43.1 |
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 |
| Hanging Protocol Storage | 1.2.840.10008.5.1.4.38.1 |
| Hardcopy Color Image Storage SOP Class (Retired) | 1.2.840.10008.5.1.1.30 |
| Hardcopy Grayscale Image Storage SOP Class (Retired) | 1.2.840.10008.5.1.1.29 |

| SOP Class Name | SOP Class UID |
|---|---|
| Hemodynamic Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.2.1 |
| Implant Assembly Template Storage | 1.2.840.10008.5.1.4.44.1 |
| Implant Template Group Storage | 1.2.840.10008.5.1.4.45.1 |
| Implantation Plan SR Storage | 1.2.840.10008.5.1.4.1.1.88.70 |
| Intraocular Lens Calculations Storage | 1.2.840.10008.5.1.4.1.1.78.8 |
| Intravascular Optical Coherence Tomography Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.14.1 |
| Intravascular Optical Coherence Tomography Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.14.2 |
| Keratometry Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.3 |
| Key Object Selection Document Storage | 1.2.840.10008.5.1.4.1.1.88.59 |
| Lensometry Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.1 |
| Macular Grid Thickness and Volume Report Storage | 1.2.840.10008.5.1.4.1.1.79.1 |
| Mammography CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.50 |
| Media Storage Directory Storage | 1.2.840.10008.1.3.10 |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 |
| Multi-frame Single Bit Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.1 |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 |
| Nuclear Medicine Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.5 |
| Ophthalmic Axial Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.7 |
| Ophthalmic Photography 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 |
| Ophthalmic Photography 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 |
| Ophthalmic Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.4 |
| Ophthalmic Visual Field Static Perimetry Measurements Storage | 1.2.840.10008.5.1.4.1.1.80.1 |
| Philips Private MR Series Data Storage | 1.3.46.670589.11.0.0.12.2 |
| Positron Emission Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.128 |
| Procedure Log Storage | 1.2.840.10008.5.1.4.1.1.88.40 |
| Pseudo-Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.3 |

| SOP Class Name | SOP Class UID |
|---|---|
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 |
| Real World Value Mapping Storage | 1.2.840.10008.5.1.4.1.1.67 |
| Respiratory Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.6.1 |
| RT Beams Delivery Instruction Storage | 1.2.840.10008.5.1.4.34.7 |
| RT Beams Delivery Instruction Storage (Retired) | 1.2.840.10008.5.1.4.34.1 |
| RT Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.4 |
| RT Brachy Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.6 |
| RT Dose Storage | 1.2.840.10008.5.1.4.1.1.481.2 |
| RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 |
| RT Ion Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.9 |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 |
| RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 |
| RT Plan Varian 1 Storage | 1.2.246.352.70.1.70 |
| RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 |
| RT Treatment Record Varian 1 Storage | 1.2.246.352.70.1.71 |
| RT Treatment Summary Record Storage | 1.2.840.10008.5.1.4.1.1.481.7 |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 |
| Siemens CSA Non-Image Storage | 1.3.12.2.1107.5.9.1 |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 |
| Spectacle Prescription Report Storage | 1.2.840.10008.5.1.4.1.1.78.6 |
| Standalone Curve Storage (Retired) | 1.2.840.10008.5.1.4.1.1.9 |
| Standalone Modality LUT Storage (Retired) | 1.2.840.10008.5.1.4.1.1.10 |
| Standalone Overlay Storage (Retired) | 1.2.840.10008.5.1.4.1.1.8 |
| Standalone PET Curve Storage (Retired) | 1.2.840.10008.5.1.4.1.1.129 |
| Standalone VOI LUT Storage (Retired) | 1.2.840.10008.5.1.4.1.1.11 |
| Stereometric Relationship Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.3 |
| Stored Print Storage SOP Class (Retired) | 1.2.840.10008.5.1.1.27 |
| Subjective Refraction Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.4 |

| SOP Class Name | SOP Class UID |
|---|---|
| Surface Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.5 |
| Text SR Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.88.1 |
| Toshiba US Private Data Storage | 1.2.392.200036.9116.7.8.1.1.1 |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 |
| Ultrasound Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 |
| Ultrasound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 |
| Ultrasound Multi-frame Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.3 |
| Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 |
| Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 |
| Video Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 |
| Visual Acuity Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.5 |
| VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 |
| VL Image Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.77.1 |
| VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 |
| VL Multi-frame Image Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.77.2 |
| VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 |
| VL Slide-Coordinates Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.3 |
| VL Whole Slide Microscopy Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.6 |
| Waveform Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.9.1 |
| X Ray 3D Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.1 |
| X Ray 3D Craniofacial Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.2 |
| XA/XRF Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.5 |
| X-Ray Angiographic Bi-Plane Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.12.3 |
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 |
| X-Ray Radiation Dose SR Storage | 1.2.840.10008.5.1.4.1.1.88.67 |
| X-Ray Radiofluoroscopic Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 |

The MIM Client Application AE and MIM Assistant AE support these SOP classes for **Query/Retrieve as SCU**:

## **Query/Retrieve as SCU** *(Table 2)*

| SOP Class Name | SOP Class UID |
|---|---|
| Study Root Query Retrieve Information Model FIND | 1.2.840.10008.5.1.4.1.2.2.1 |
| Study Root Query Retrieve Information Model MOVE | 1.2.840.10008.5.1.4.1.2.2.2 |
| Study Root Query Retrieve Information Model GET | 1.2.840.10008.5.1.4.1.2.2.3 |

The MIM Client Application AE supports these SOP classes for **Printing as SCU**:

**Printing as SCU** *(Table 3)*

| SOP Class Name | SOP Class UID |
|---|---|
| Basic Grayscale Print Management | 1.2.840.10008.5.1.1.9 |
| Basic Color Print Management | 1.2.840.10008.5.1.1.18 |
| Basic Film Session | 1.2.840.10008.5.1.1.1 |
| Basic Film Box | 1.2.840.10008.5.1.1.2 |
| Basic Grayscale Image Box | 1.2.840.10008.5.1.1.4 |
| Basic Color Image Box | 1.2.840.10008.5.1.1.4.1 |
| Print Job | 1.2.840.10008.5.1.1.14 |
| Printer | 1.2.840.10008.5.1.1.16 |

The MIM Client Application AE supports these SOP classes for **Performing UPS tasks as an SCU**:

**Performing UPS tasks as an SCU** *(Table 4)*

| SOP Class Name | SOP Class UID |
|---|---|
| Unified Procedure Step - Pull SOP Class | 1.2.840.10008.5.1.4.34.6.3 |

#### *7.2.1.2 Association Policies*

##### *7.2.1.2.1 General*

The DICOM standard Application Context 1.2.840.10008.3.1.1.1 is used for all associations.

##### *7.2.1.2.2 Number of Associations*

The AE may create any number of associations to different AEs. The number of simultaneous associations to a particular AE may be greater than one depending on the Real-World Activity being performed.

##### *7.2.1.2.3 Asynchronous Nature*

Asynchronous mode of operation is not supported. All operations will be performed synchronously.

##### *7.2.1.2.4 Implementation Identifying Information*

| | |
|---|---|
| **Implementation UID:** | 1.2.826.0.1.3680043.2.419.1 |
| **Implementation Version:** | MIM <major>.<minor>.<release>.<build> |

#### *7.2.1.2.5 Association Initiation Policies*

##### *7.2.1.2.5.1 Activity: Storage*

###### *7.2.1.2.5.1.1 Description and Sequencing of Activity*

For each series to be sent, a single attempt will be made to send to selected remote AE. If a Temporary Congestion message is received, the AE will wait 10 seconds and attempt to reconnect. Otherwise, the user will be shown that the association could not be made, along with the specific error message and status code. The user will be given the option to retry the transmission.

###### *7.2.1.2.5.1.2 Proposed Presentation Contexts*

MIM will propose Presentation Contexts only for the SOP Class of the instance that is to be transferred. For that SOP Class, MIM will propose multiple Presentation Contexts, one for each of the supported Transfer Syntaxes, and an additional Presentation Context with all of the supported Transfer Syntaxes, in order to determine which Transfer Syntaxes the remote SCP supports, and which it prefers.

MIM will propose both Explicit and Implicit VR Little Endian transfer syntax for all transfers except those involving RT DICOM objects. Due to the storage limitations of Explicit VR Little Endian, RT DICOM will always be transferred with only Implicit VR Little Endian transfer syntax. For other DICOM objects, MIM will also propose the native transfer syntax of the object being transferred if it is not already in Implicit VR Little Endian or Explicit VR Little Endian transfer syntax (e.g. a compressed transfer syntax).

| **Presentation Context Table** | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| See Table 7.2.1.1.1 | See Table 7.2.1.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |

###### *7.2.1.2.5.1.3 Extended Negotiation*

No extended negotiation is performed.

###### *7.2.1.2.5.1.4 SOP Specific Conformance for SOP Classes*

MIM Client AE and MIM Assistant AE provide standard conformance to the Storage

Service Class.

If the negotiated transfer syntax does not match the native transfer syntax of the DICOM object being transmitted, such as compressed data being sent to an AE that does accept compressed data, MIM will decompress the data and transfer it using the negotiated transfer syntax.

#### *7.2.1.2.5.1.5 Response Status*

MIM will display a warning/error to the user if any response other than Success (0000) is received.

### *7.2.1.2.5.2 Activity: Query/Retrieve*

#### *7.2.1.2.5.2.1 Description and Sequencing of Activity*

In performing a query/retrieve, the user will first perform a search against the remote AE using a series of C-FIND operations. MIM always starts at Study Level and then does a Series Level and optionally Image Level query. Once the search results have been displayed to user, a C-MOVE or C-GET operation may be performed, using a new association.

#### *7.2.1.2.5.2.2 Proposed Presentation Contexts*

MIM proposes both Explicit and Implicit Little VR Endian presentation contexts for the SOP classes it requests, and will accept whichever the remote AE prefers.

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| See Table 7.2.1.1.2 | See Table 7.2.1.1.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| See Table 7.2.1.1.2 | See Table 7.2.1.1.2 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |

#### *7.2.1.2.5.2.3 Extended Negotiation*

No extended negotiation is performed.

#### *7.2.1.2.5.2.4 SOP Specific Conformance for SOP Classes*

MIM Client AE and MIM Assistant AE provide standard conformance to the Query/Retrieve Service Classes.

#### *7.2.1.2.5.2.5 Response Status*

MIM will display a warning/error to the user if any response other than Success (0x0000) or Pending (0xFF00) is received.

#### *7.2.1.2.5.3 Activity: Printing*

##### *7.2.1.2.5.3.1 Description and Sequencing of Activity*

When printing, the user will select images to be printed. The MIM AE will then open association with the remote printer AE. A Verification action will be performed to confirm the printer is available. Then a series of N-CREATE operations for film sessions and film boxes will be performed, then N-ACTION to print the job.

##### *7.2.1.2.5.3.2 Proposed Presentation Contexts*

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| See Table 7.2.1.1.3 | See Table 7.2.1.1.3 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

##### *7.2.1.2.5.3.3 Extended Negotiation*

No extended negotiation is performed.

##### *7.2.1.2.5.3.4 SOP Specific Conformance for SOP Classes*

MIM Client AE provides standard conformance to the Print and Verification Service Classes.

##### *7.2.1.2.5.3.5 Response Status*

MIM will display a warning/error to the user if any response other than Success (0000) is received.

#### *7.2.1.2.5.4 Activity: Get UPS Information (N-GET)*

##### *7.2.1.2.5.4.1 Description and Sequencing of Activity*

The MIM AE will request information about a UPS from a UPS SCP by issuing an N-GET request that includes the SOPInstanceUID for the desired UPS and required Attribute Match Keys.

##### *7.2.1.2.5.4.2 Proposed Presentation Contexts*

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| Unified Procedure Step - Pull SOP Class | 1.2.840.10008.5.1.4.34.6.3 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

#### *7.2.1.2.5.4.3 Extended Negotiation*

No extended negotiation is performed.

#### *7.2.1.2.5.4.4 SOP Specific Conformance for SOP Classes*

MIM Client AE provides standard conformance to the Get UPS Information (N-GET) Service Class.

In addition to Type 1 and 2 Return Key Attributes, the MIM AE requests the following Type 3 Return Key Attributes when issuing an N-GET request:

| Attribute Name | Tag Number | VR | Comment |
|---|---|---|---|
| **Unified Procedure Step Scheduled Procedure Information Module** | | | |
| Scheduled Procedure Step Modification Date and Time | 0040,4010 | DT | Scheduled Procedure Step Modification Date and Time shall be retrieved with Single Value Matching or Range Matching. |
| Expected Completion Date and Time | 0040,4011 | DT | Expected Completion Date and Time shall be retrieved with Single Value Matching or Range Matching. |
| Comments on the Scheduled Procedure Step | 0040,0400 | LT | |
| Output Destination Sequence | 0040,4070 | SQ | The Attributes of the Output Destination Sequence shall only be retrieved with Sequence Matching. |

> ***Please Note:*** When reading the Input Information Sequence of a UPS, the MIM AE only supports a value of “DICOM” for the “Type of Instances” field.

#### *7.2.1.2.5.4.5 Response Status*

MIM will display a warning/error to the user if any response other than Success (0000) is received.

### *7.2.1.2.5.5 Activity: Change UPS State (N-ACTION)*

#### *7.2.1.2.5.5.1 Description and Sequencing of Activity*

The MIM AE will update the state of a UPS object which it plans to claim or has claimed by issuing an N-ACTION request that includes the SOP Instance UID, Transaction UID, and new Procedure Step State to the UPS SCP which scheduled the UPS. If the UPS is being transitioned into the “IN PROGRESS” state from the “SCHEDULED” state, the TransactionUID will be generated by the MIM AE.

In any event where the user is unable to meet the final state requirements for completing a UPS, the MIM AE will attempt to issue another N-ACTION request to change the UPS state to “CANCELED.” The user may also voluntarily initiate a state

change to “CANCELED” at any time by aborting the MIM Workflow or closing the MIM application.

#### *7.2.1.2.5.5.2 Proposed Presentation Contexts*

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| Unified Procedure Step - Pull SOP Class | 1.2.840.10008.5.1.4.34.6.3 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

#### *7.2.1.2.5.5.3 Extended Negotiation*

No extended negotiation is performed.

#### *7.2.1.2.5.5.4 SOP Specific Conformance for SOP Classes*

MIM Client AE provides standard conformance to the Change UPS State (N-ACTION) Service Class.

#### *7.2.1.2.5.5.5 Response Status*

MIM will display a warning/error to the user if any response other than Success (0000) is received.

### *7.2.1.2.5.6 Activity: Update UPS Information (N-SET)*

#### *7.2.1.2.5.6.1 Description and Sequencing of Activity*

The MIM AE will update the UPS at the UPS SCP with new information by issuing an N-SET request that includes the SOP Instance UID and Transaction UID along with attribute tag and value pairs to be updated.

#### *7.2.1.2.5.6.2 Proposed Presentation Contexts*

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| Unified Procedure Step - Pull SOP Class | 1.2.840.10008.5.1.4.34.6.3 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

#### *7.2.1.2.5.6.3 Extended Negotiation*

No extended negotiation is performed.

#### *7.2.1.2.5.6.4 SOP Specific Conformance for SOP Classes*

MIM Client AE provides standard conformance to the Set UPS Information (N-SET) Service Classes.

#### *7.2.1.2.5.6.5 Response Status*

MIM will display a warning/error to the user if any response other than Success (0000) is received.

### *7.2.1.2.6 Association Acceptance Policy*

The MIM and MIM Assistant AEs do not accept associations except for Storage Commitment responses.

## *7.2.2 MIM DICOM Store Server AE*

### *7.2.2.1 SOP Classes*

The MIM DICOM Store Server AE supports these SOP classes for **Storage as SCP**:

*Table 4*

| SOP Class Name | SOP Class UID |
|---|---|
| Verification SOP Class | 1.2.840.10008.1.1 |
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 |
| Arterial Pulse Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.5.1 |
| Audio SR Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.88.2 |
| Autorefraction Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.2 |
| Basic Structured Display Storage | 1.2.840.10008.5.1.4.1.1.131 |
| Basic Study Content Notification SOP Class (Retired) | 1.2.840.10008.1.9 |
| Basic Text SR Storage | 1.2.840.10008.5.1.4.1.1.88.11 |
| Basic Voice Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.1 |
| Blending Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.4 |
| Breast Tomosynthesis Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.3 |
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 |
| Chest CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.65 |
| Colon CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.69 |
| Color Palette Storage | 1.2.840.10008.5.1.4.39.1 |
| Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.2 |

| | |
|---|---|
| Comprehensive SR Storage | 1.2.840.10008.5.1.4.1.1.88.33 |
| Comprehensive SR Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.88.4 |
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 |
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 |
| Deformable Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.3 |
| Detail SR Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.88.3 |
| DICOS CT Image Storage | 1.2.840.10008.5.1.4.1.1.501.1 |
| DICOS Digital X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.501.2.1 |
| DICOS Digital X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.501.2.2 |
| DICOS Threat Detection Report Storage | 1.2.840.10008.5.1.4.1.1.501.3 |
| Digital Intra-oral X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.3 |
| Digital Intra-oral X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.3.1 |
| Digital Mammography X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 |
| Digital Mammography X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 |
| Digital X-Ray Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.1.1 |
| Digital X-Ray Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.1.1.1 |
| Eddy Current Image Storage | 1.2.840.10008.5.1.4.1.1.601.1 |
| Eddy Current Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.601.2 |
| Encapsulated CDA Storage | 1.2.840.10008.5.1.4.1.1.104.2 |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 |
| Enhanced MR Color Image Storage | 1.2.840.10008.5.1.4.1.1.4.3 |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 |
| Enhanced PET Image Storage | 1.2.840.10008.5.1.4.1.1.130 |
| Enhanced SR Storage | 1.2.840.10008.5.1.4.1.1.88.22 |
| Enhanced US Volume Storage | 1.2.840.10008.5.1.4.1.1.6.2 |
| Enhanced XA Image Storage | 1.2.840.10008.5.1.4.1.1.12.1.1 |
| Enhanced XRF Image Storage | 1.2.840.10008.5.1.4.1.1.12.2.1 |
| General Audio Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.4.2 |
| General ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.2 |
| Generic Implant Template Storage | 1.2.840.10008.5.1.4.43.1 |

| | |
|---|---|
| Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.1 |
| Hanging Protocol Storage | 1.2.840.10008.5.1.4.38.1 |
| Hardcopy Color Image Storage SOP Class (Retired) | 1.2.840.10008.5.1.1.30 |
| Hardcopy Grayscale Image Storage SOP Class (Retired) | 1.2.840.10008.5.1.1.29 |
| Hemodynamic Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.2.1 |
| Implant Assembly Template Storage | 1.2.840.10008.5.1.4.44.1 |
| Implant Template Group Storage | 1.2.840.10008.5.1.4.45.1 |
| Implantation Plan SR Storage | 1.2.840.10008.5.1.4.1.1.88.70 |
| Intraocular Lens Calculations Storage | 1.2.840.10008.5.1.4.1.1.78.8 |
| Intravascular Optical Coherence Tomography Image Storage - For Presentation | 1.2.840.10008.5.1.4.1.1.14.1 |
| Intravascular Optical Coherence Tomography Image Storage - For Processing | 1.2.840.10008.5.1.4.1.1.14.2 |
| Keratometry Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.3 |
| Key Object Selection Document Storage | 1.2.840.10008.5.1.4.1.1.88.59 |
| Lensometry Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.1 |
| Macular Grid Thickness and Volume Report Storage | 1.2.840.10008.5.1.4.1.1.79.1 |
| Mammography CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.50 |
| Media Storage Directory Storage | 1.2.840.10008.1.3.10 |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 |
| Multi-frame Single Bit Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.1 |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 |
| Nuclear Medicine Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.5 |
| Ophthalmic Axial Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.7 |
| Ophthalmic Photography 16 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.2 |
| Ophthalmic Photography 8 Bit Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.1 |
| Ophthalmic Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.4 |
| Ophthalmic Visual Field Static Perimetry Measurements Storage | 1.2.840.10008.5.1.4.1.1.80.1 |
| Philips Private MR Series Data Storage | 1.3.46.670589.11.0.0.12.2 |

| | |
|---|---|
| Positron Emission Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.128 |
| Procedure Log Storage | 1.2.840.10008.5.1.4.1.1.88.40 |
| Pseudo-Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.3 |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 |
| Real World Value Mapping Storage | 1.2.840.10008.5.1.4.1.1.67 |
| Respiratory Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.6.1 |
| RT Beams Delivery Instruction Storage | 1.2.840.10008.5.1.4.34.7 |
| RT Beams Delivery Instruction Storage (Retired) | 1.2.840.10008.5.1.4.34.1 |
| RT Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.4 |
| RT Brachy Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.6 |
| RT Dose Storage | 1.2.840.10008.5.1.4.1.1.481.2 |
| RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 |
| RT Ion Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.9 |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 |
| RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 |
| RT Plan Varian 1 Storage | 1.2.246.352.70.1.70 |
| RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 |
| RT Treatment Record Varian 1 Storage | 1.2.246.352.70.1.71 |
| RT Treatment Summary Record Storage | 1.2.840.10008.5.1.4.1.1.481.7 |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 |
| Siemens CSA Non-Image Storage | 1.3.12.2.1107.5.9.1 |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 |
| Spectacle Prescription Report Storage | 1.2.840.10008.5.1.4.1.1.78.6 |
| Standalone Curve Storage (Retired) | 1.2.840.10008.5.1.4.1.1.9 |
| Standalone Modality LUT Storage (Retired) | 1.2.840.10008.5.1.4.1.1.10 |
| Standalone Overlay Storage (Retired) | 1.2.840.10008.5.1.4.1.1.8 |
| Standalone PET Curve Storage (Retired) | 1.2.840.10008.5.1.4.1.1.129 |
| Standalone VOI LUT Storage (Retired) | 1.2.840.10008.5.1.4.1.1.11 |
| Stereometric Relationship Storage | 1.2.840.10008.5.1.4.1.1.77.1.5.3 |

| | |
|---|---|
| Stored Print Storage SOP Class (Retired) | 1.2.840.10008.5.1.1.27 |
| Subjective Refraction Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.4 |
| Surface Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.5 |
| Text SR Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.88.1 |
| Toshiba US Private Data Storage | 1.2.392.200036.9116.7.8.1.1.1 |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 |
| Ultrasound Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 |
| Ultrasound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 |
| Ultrasound Multi-frame Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.3 |
| Video Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 |
| Video Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 |
| Video Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 |
| Visual Acuity Measurements Storage | 1.2.840.10008.5.1.4.1.1.78.5 |
| VL Endoscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.1 |
| VL Image Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.77.1 |
| VL Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.2 |
| VL Multi-frame Image Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.77.2 |
| VL Photographic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.4 |
| VL Slide-Coordinates Microscopic Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.3 |
| VL Whole Slide Microscopy Image Storage | 1.2.840.10008.5.1.4.1.1.77.1.6 |
| Waveform Storage - Trial (Retired) | 1.2.840.10008.5.1.4.1.1.9.1 |
| X Ray 3D Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.1 |
| X Ray 3D Craniofacial Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.2 |
| XA/XRF Grayscale Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.5 |
| X-Ray Angiographic Bi-Plane Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.12.3 |
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 |
| X-Ray Radiation Dose SR Storage | 1.2.840.10008.5.1.4.1.1.88.67 |
| X-Ray Radiofluoroscopic Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 |

#### *7.2.2.2 Association Policies*

##### *7.2.2.2.1 General*

The DICOM standard Application Context 1.2.840.10008.3.1.1.1 is used for all

associations.

#### *7.2.2.2.2 Number of Associations*

By default the AE will accept up to 8 simultaneous associations. This number can be configured through the software. Any association attempts past that will result in a REJECTED-TRANSIENT message.

#### *7.2.2.2.3 Asynchronous Nature*

Asynchronous mode of operation is not supported. All operations will be performed synchronously.

#### *7.2.2.2.4 Implementation Identifying Information*

| | |
|---|---|
| **Implementation UID:** | 1.2.826.0.1.3680043.2.419.1 |
| **Implementation Version:** | MIM <major>**.**<minor>**.**<release>**.**<build> |

#### *7.2.2.2.5 Association Initiation Policy*

#### *7.2.2.2.5.1 Activity: Storage*

#### *7.2.2.2.5.1.1 Description and Sequencing of Activity*

The DICOM Store Server AE does not initiate associations except in the case of sending Storage Commitment responses, and only does this as the result of a Storage action.

#### *7.2.2.2.6 Association Acceptance Policy*

#### *7.2.2.2.6.1 Description and Sequencing of Activity*

The MIM DICOM Store Server AE listens for incoming associations, by default, on port 4008. Its default AE title is AE_MIM, but by default it is also a promiscuous receiver, so all incoming associations are accepted as long as they meet the Presentation Context restrictions listed below.

Once an association is made, the AE accepts C-STORE requests for SOP Instances. When the association is closed, the SOP Instances will be stored in the MIM archive as configured.

#### *7.2.2.2.6.1.1 Accepted Presentation Contexts*

By default, the DICOM Store Server AE will accept all presentation context that match the list in the table below. Transfer Syntaxes may be limited via configuration to remove transfer syntaxes that may cause problems.

For RT DICOM Objects, the AE will not accept Explicit VR Little Endian transfer syntax

due to compatibility concerns with the length of certain fields, in accordance with the recommendations of IHE-RO.

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| See Table 7.2.2.1.1 | See Table 7.2.2.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Deflated Explicit VR Little Endian | 1.2.840.10008.1.2.1.99 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| | | JPEG Lossless Non-Hierarchical (Process 14) | 1.2.840.10008.1.2.4.57 | | |
| | | JPEG Lossless | 1.2.840.10008.1.2.4.70 | | |
| | | JPEG LS Lossless | 1.2.840.10008.1.2.4.80 | | |
| | | JPEG LS Lossy Near-Lossless | 1.2.840.10008.1.2.4.81 | | |
| | | MPEG2 Main Profile / Main Level | 1.2.840.10008.1.2.4.100 | | |
| | | RLE Lossless | 1.2.840.10008.1.2.5 | | |
| | | JPEG Baseline (Process 1) | 1.2.840.10008.1.4.50 | | |
| | | JPEG Extended (Process 2 & 4) | 1.2.840.10008.1.4.51 | | |
| | | JPEG 2000 Image Compression (Lossless Only) | 1.2.840.10008.1.4.90 | | |
| | | JPEG 2000 Image Compression (Lossless or Lossy) | 1.2.840.10008.1.4.91 | | |

#### *7.2.2.2.6.1.2 Extended Negotiation*

No extended negotiation is performed.

#### *7.2.2.2.6.1.3 SOP Specific Conformance for SOP Classes*

The MIM DICOM Store Server AE provides standard conformance to the Storage and Verifications Service Classes.

#### *7.2.2.2.6.1.4 Response Status*

If an abnormal condition occurs, the AE will return a status of 0x0110 (Processing Failure), along with the error condition. Otherwise, the AE will return a status of 0x0000 (Success).

### *7.2.3 MIM DICOM Query/Retrieve Server AE*

#### *7.2.3.1 SOP Classes*

The MIM DICOM Query/Retrieve Server AE supports these SOP classes as a **SCP**:

*Table 5*

| SOP Class Name | SOP Class UID |
|---|---|
| Verification | 1.2.840.10008.1.1 |
| Patient Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 |
| Patient Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 |
| Patient Root Query/Retrieve Information Model - GET | 1.2.840.10008.5.1.4.1.2.1.3 |
| Study Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 |
| Study Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 |
| Study Root Query/Retrieve Information Model - GET | 1.2.840.10008.5.1.4.1.2.2.3 |

#### *7.2.3.2 Association Policies*

##### *7.2.3.2.1 General*

The DICOM standard Application Context 1.2.840.10008.3.1.1.1 is used for all associations.

##### *7.2.3.2.2 Number of Associations*

By default, the AE will accept up to 5 simultaneous associations. This number can be configured through the software. Any association attempts past that will result in a rejection message.

##### *7.2.3.2.3 Asynchronous Nature*

Asynchronous mode of operation is not supported. All operations will be performed synchronously.

#### *7.2.3.2.4 Implementation Identifying Information*

| | |
|---|---|
| **Implementation UID:** | 1.2.826.0.1.3680043.2.419.1 |
| **Implementation Version:** | MIM <major>.<minor>.<release>.<build> |

#### *7.2.3.2.5 Association Initiation Policy*

##### *7.2.3.2.5.1 Activity: Storage*

###### *7.2.3.2.5.1.1 Description and Sequencing of Activity*

The MIM DICOM Query/Retrieve Server AE initiates a Storage operation in response to a C-MOVE operation. A single association will be made for each C-MOVE, and all the requested SOP Instances will be sent on that association.

###### *7.2.3.2.5.1.2 Proposed Presentation Contexts*

MIM will propose Presentation Contexts only for the SOP Class of the instance that is to be transferred. For that SOP Class, MIM will propose multiple Presentation Contexts, one for each of the supported Transfer Syntaxes, and an additional Presentation Context with all of the supported Transfer Syntaxes, in order to determine which Transfer Syntaxes the remote SCP supports, and which it prefers.

MIM will propose both Explicit and Implicit VR Little Endian transfer syntax for all transfers except those involving RT DICOM objects. Due to the storage limitations of Explicit VR Little Endian, RT DICOM will always be transferred with only Implicit VR Little Endian transfer syntax.

| **Presentation Context Table** | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| See Table 7.2.1.1.1 | See Table 7.2.1.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |

###### *7.2.3.2.5.1.3 Extended Negotiation*

No extended negotiation is performed.

###### *7.2.3.2.5.1.4 SOP Specific Conformance for SOP Classes*

The MIM DICOM Query/Retrieve Server AE provides standard conformance to the Storage Service Class.

#### *7.2.3.2.5.1.5 Response Status*

The MIM DICOM Query/Retrieve Server AE will log a warning/error if any response other than Success (0000) is received.

### *7.2.3.2.6 Association Acceptance Policy*

#### *7.2.3.2.6.1 Description and Sequencing of Activity*

The MIM DICOM Query/Retrieve Server AE listens for incoming associations, by default, on port 8177. Its default AE title is MIMDCMQUERY. It is not a promiscuous receiver. Associations will only be accepted from AEs whose AE Title is configured specifically to allow them to connect.

Once an association is made, the AE accepts C-FIND, C-MOVE, and C-GET requests. When a C-FIND request is made, the AE will search the MIM database and return the matching results in a series of C-FIND responses. Each response aside from the last will have a status of 0xFF00 (Pending), and the final will have a status of 0x0000 (Success).

For C-MOVE requests, the AE will accept the request and initiate a new association to perform the C-STORE operation to the desired AE title.

For C-GET requests, the AE will perform C-STORE operations on the same association.

#### *7.2.3.2.6.1.1 Accepted Presentation Contexts*

The MIM DICOM Query/Retrieve AE will accept all presentation contexts that match the list in the table below.

| **Presentation Context Table** | | | | | |
|---|---|---|---|---|---|
| **Abstract Syntax** | | **Transfer Syntax** | | **Role** | **Extended Negotiation** |
| **Name** | **UID** | **Name List** | **UID List** | | |
| See Table 7.2.3.1.1 | See Table 7.2.3.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | See 7.2.3.2.6.1.2 |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |

#### *7.2.3.2.6.1.2 Extended Negotiation*

For C-FIND operations, the MIM Query/Retrieve Server AE will accept extended negotiation requests for relational querying.

For C-GET and C-MOVE operations, the MIM Query/Retrieve Server AE will accept extended negotiation requests for relational retrieval.

#### *7.2.3.2.6.1.3 SOP Specific Conformance for SOP Classes*

The MIM Query/Retrieve Server AE provides standard conformance to all non-retired Query/Retrieve SOP classes.

#### *7.2.3.2.6.1.4 Dataset Specific Conformance for Patient Root QR and Study Root QR Information Models*

The MIM DICOM Query/Retrieve Server AE supports matching and retrieval of all DICOM Attributes at each of the PATIENT, STUDY, SERIES, and IMAGE levels, with some exceptions: It does not allow matching on Sequence tags; it does not allow retrieval on Sequence tags at the PATIENT, STUDY, or SERIES levels; it does not support retrieval by the Number of Patient Related Studies, Number of Patient Related Series, Number of Patient Related Instances, Number of Study Related Series, and Number of Study Related Instances Attributes. It supports the character sets for querying (as specified by the Specific Character Set (0008,0005) tag) that are listed in Table 9.1.

Queried Attributes must match the Query Retrieve Level of a query. PATIENT-level queries may include Attributes from the Common Patient IE Modules; STUDY-level queries may include Attributes from the Common Study IE Modules; SERIES-level queries may include Attributes from the Common Series IE Modules, Common Frame of Reference IE Modules, and Common Equipment Modules; and IMAGE-level queries may include Attributes from the Common Image IE Modules in PS3.3, section C.7 of the DICOM Standard.

Matching and retrieval are subject to the limitations of MIM's metabase. The DICOM Query/Retrieve Server AE cannot match or retrieve on the DICOM Attributes specified in MIM's MetabasePrefs::DICOMTAGSTOIGNORE. It cannot match or retrieve on the PixelData tag or on anything after the Pixel Data tag. Most metabase tag values are truncated to a length of 64 characters by default, or the value of MetabasePrefs::MAXDICOMTAGVALUEWIDTH. Sequences are truncated to a length of 10 by default, or the value of MetabasePrefs::MAXDICOMSEQUENCELENGTH. By default, MIM does not truncate the values of the following Attributes:
Series Instance UID; SOP Instance UID; Frame Of Reference UID; Referenced SOP Instance UID; Image Orientation Patient; Detector Vector; Energy Window Vector; and RT Image Description. Additionally, MIM's metabase retains the full value of any other Attributes that are manually added to MetabasePrefs::DICOMTAGSTHATSHOULDNOTBETRUNCATED.

#### *7.2.3.2.6.1.5 Response Status*

If an abnormal condition occurs, the AE will return a status of 0x0110 (Processing Failure), along with the error condition. Otherwise, the AE will return a status of 0x0000 (Success).

## 7.3 Network Interfaces

### 7.3.1 Physical Network Interface

MIM supports any physical network interface that provides TCP/IP protocol support. Multiple network interfaces are supported.

### 7.3.2 Additional Protocols

MIM does not provide or make use of additional service protocols for system management. This may be configured on a per-system basis using the facilities provided by the host operating system or by third-party software.

### 7.3.3 IPv4 and IPv6

MIM supports TCP over IPv4 or IPv6.

# 8 Configuration

MIM's configurations are stored in formatted text-based configuration files. The vast majority of these can be configured through the software. Please consult the MIM Installation and Setup Guide for further information.

## 8.1 AE Title/Presentation Address Mapping

The application entities provided by MIM communicate using TCP/IP over all network interfaces present on the host system. The IP address is dependent on system configuration.

### 8.1.1 Local AE Titles

The default AE Title and Ports for MIM services are summarized in the following table.

| Application Entity | Default AE Title | Default TCP/IP Port |
|---|---|---|
| MIM DICOM Store Server | AE_MIM | 4008 |
| MIM DICOM Query/Retrieve Server | MIMDCMQUERY | 8177 |

The AE Title used by the MIM Client AE / MIM Assistant AE when making association

requests as an SCU may be configured as the Calling AE Title setting. If left blank (the default setting) the AE Title of the MIM DICOM Store Server AE will be used.

## *8.2 Parameters*

| Parameter | Configurable (Yes/No) | Default Value |
|---|---|---|
| **General Parameters** | | |
| Calling AE Title as SCU | Yes | Blank (use DICOM Store Server AE Title) |
| Accept Timeout for C-STORE as SCU | Yes | 30000ms |
| Connect Timeout for C-STORE as SCU | Yes | 30000ms |
| DIMSE Response Timeout for C-STORE as SCU | Yes | 60000ms |
| Idle Timeout for C-STORE as SCU | Yes | 60000ms |
| Max PDU Size (Receive) for C-STORE as SCU | Yes | 16384 bytes |
| Max PDU Size (Send) for C-STORE as SCU | Yes | 16384 bytes |
| Socket Close Delay for C-STORE as SCU | Yes | 50ms |
| Storage Commit Response Timeout for C-STORE as SCU | Yes | 300000ms |
| Require Storage Commitment | Yes | No |
| **MIM Client AE / MIM Assistant AE Parameters** | | |
| Use C-GET for query and retrieve | Yes | No |
| Concurrent Connections per Remote AE | Yes | Unlimited |
| Accept Timeout for C-FIND, C-MOVE, and C-GET as SCU | Yes | 240000ms |
| Connect Timeout for C-FIND, C-MOVE, and C-GET as SCU | Yes | 240000ms |
| DIMSE Timeout for C-FIND, C-MOVE, and C-GET as SCU | Yes | 240000ms |
| Max PDU Size (Receive) for C-FIND, C-MOVE, and C-GET as SCU | No | 16384 bytes |
| Max PDU Size (Send) for C-FIND, C-MOVE, and C-GET as SCU | No | 16384 bytes |
| **MIM DICOM Store Server AE Parameters** | | |
| AE Title | Yes | AE_MIM |
| Additional AE Titles | Yes | None |
| Port | Yes | 4008 |
| Maximum Associations | Yes (1 – 20) | 8 |

| | | |
|---|---|---|
| Max PDU Size (Receive) for C-STORE as SCP | Yes | 16384 bytes |
| Max PDU Size (Send) for C-STORE as SCP | Yes | 16384 bytes |
| Max Archive Threads | Yes (1-20) | 1 |
| Receive Promiscuously | Yes | No |
| Support Storage Commitment | Yes | No |
| Association Request Timeout for C-STORE as SCP | Yes | 5000ms |
| Commit Timeout for C-STORE as SCP | Yes | 300000ms |
| Data Receive Timeout for C-STORE as SCP | Yes | 30000ms |
| Idle Timeout for C-STORE as SCP | Yes | 60000ms |
| Socket Close Delay for C-STORE as SCP | Yes | 50ms |
| Allow uncompressed transfer syntax only | Yes | No |
| Disallowed Transfer Syntax | Yes | Deflated Explicit VR Little Endian, MPEG2 Main Profile / Main Level |
| Additional Supported SOP Classes | Yes | None |
| **MIM DICOM Query / Retrieve Server AE Parameters** | | |
| AE Title | Yes | MIMDCMQUERY |
| Port | Yes | 8177 |
| Max Associations | Yes | 5 |
| Permitted Retrieve Locations | Yes | None |
| Allow SERIES Level Queries | Yes | Yes |
| Max PDU Size (Receive) for C-FIND, C-MOVE, and C-GET as SCP | No | 16384 bytes |
| Max PDU Size (Send) for C-FIND, C-MOVE, and C-GET as SCP | No | 16384 bytes |

# *9 Support of Extended Character Sets*

MIM supports the following character sets:

| Character Set Name | Character Set Value | Read Supported | Write Supported |
|---|---|---|---|
| US-ASCII | *(blank)* | Yes | Yes |
| ISO-8859-1 | ISO_IR 100 | Yes | Yes |
| ISO-8859-2 | ISO_IR 101 | Yes | Yes |
| ISO-8859-3 | ISO_IR 109 | Yes | Yes |

| Character Set Name | Character Set Value | Read Supported | Write Supported |
|---|---|---|---|
| ISO-8859-4 | ISO_IR 110 | Yes | Yes |
| ISO-8859-5 | ISO_IR 144 | Yes | Yes |
| ISO-8859-6 | ISO_IR 127 | Yes | Yes |
| ISO-8859-7 | ISO_IR 126 | Yes | Yes |
| ISO-8859-8 | ISO_IR 138 | Yes | Yes |
| ISO-8859-9 | ISO_IR 148 | Yes | Yes |
| JIS_X0201 | ISO_IR 13 | Yes | Yes |
| TIS-620 | ISO_IR 166 | Yes | Yes |
| US-ASCII | ISO 2022 IR 6 | Yes | Yes |
| ISO-8859-1 | ISO 2022 IR 100 | Yes | Yes |
| ISO-8859-2 | ISO 2022 IR 101 | Yes | Yes |
| ISO-8859-3 | ISO 2022 IR 109 | Yes | Yes |
| ISO-8859-4 | ISO 2022 IR 110 | Yes | Yes |
| ISO-8859-5 | ISO 2022 IR 144 | Yes | Yes |
| ISO-8859-6 | ISO 2022 IR 127 | Yes | Yes |
| ISO-8859-7 | ISO 2022 IR 126 | Yes | Yes |
| ISO-8859-8 | ISO 2022 IR 138 | Yes | Yes |
| ISO-8859-9 | ISO 2022 IR 148 | Yes | Yes |
| JIS_X0201 | ISO 2022 IR 13 | Yes | Yes |
| TIS-620 | ISO 2022 IR 166 | Yes | Yes |
| JIS0208 | ISO 2022 IR 87 | Yes | Yes |
| JIS0212 | ISO 2022 IR 159 | Yes | Yes |
| cp949 | ISO 2022 IR 149 | Yes | Yes |
| UTF-8 | ISO_IR 192 | Yes | Yes |
| GB18030 | GB18030 | Yes | Yes |

## *10 Standard Extended / Specialized / Private SOP Classes*

MIM does not claim conformance to any Specialized or Private SOP classes.

## *10.1 Private Transfer Syntaxes*

No Private Transfer Syntaxes are supported.