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1. Introduction

1.1 Purpose

This DICOM Conformance Statement is written according to part PS 3.2 of the DICOM Standard. It describes the DICOM Interface of mediCAD / Query Client planning station.

1.2 Acronyms and Abbreviations

ACR:	American College of Radiology
AE:	DICOM Application Entity
ASCII:	American Standard Code for Information Interchange
DICOM:	Digital Imaging and Communications in Medicine
DIMSE:	DICOM Message Service Element
DIMSE-C:	DICOM Message Service Element with Composite information objects
IOD:	DICOM Information Object Definition
ISO:	International Standard Organization
NEMA:	National Electrical Manufacturers Association
O:	Optional Key Attribute
R:	Required Key Attribute
RAE	Remote Application Entity
RWA:	Real-World Activity
PDU:	DICOM Protocol Data Unit
SCU:	DICOM Service Class User (DICOM client)
SCP:	DICOM Service Class Provider (DICOM server)
SOP:	DICOM Service-Object Pair
UID:	Unique Identifier
VR:	Value Representation

2. Implementation Model

Application mediCAD stores and loads DICOM-files to and from the file system. In addition, mediCAD provides a storage functionality (C-STORE-SCU). Whenever a DICOM-communication is required, we offer the Query Client as an interface between mediCAD and DICOM-Networks (e.g. PACS).

There are lots of configuration possibilities how queries are performed, which tags per level, different specific charset handling options.

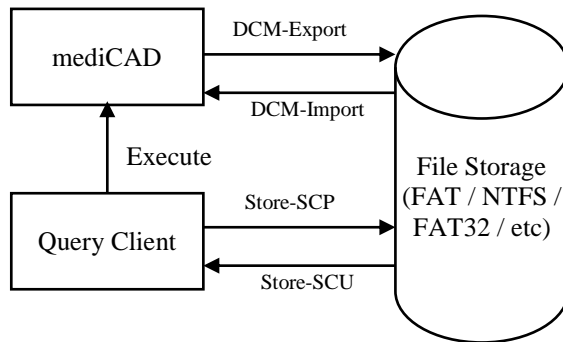
2.1 Data Flow Diagramms

Any Data flow is optional and may be active or inactive in an installation.

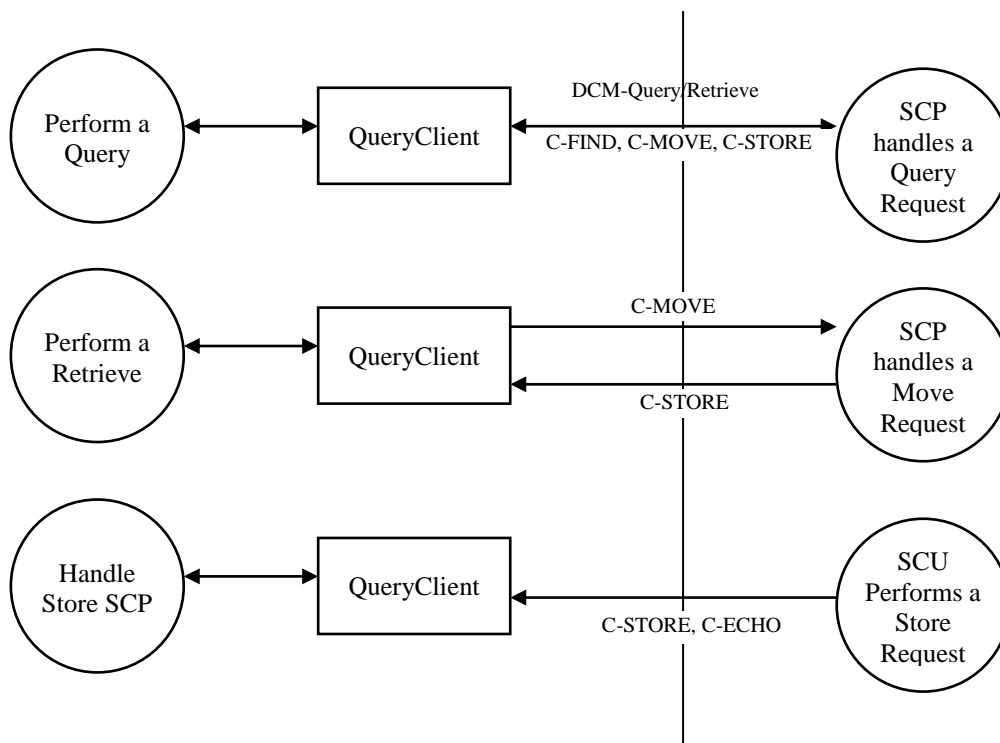
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2.1.1 MediCAD - Query Client

Query Client typically stores an image as a local file during Query/Retrieve action and then starts mediCAD with the retrieved image. Optionally you can configure Query Client to watch a folder and send all images to a specific destination.



2.1.2 DICOM Network interface of Query Client



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2.2 Functional description

Any of the following real world activities (RWA) can be applied.

2.2.1 RWA I – Query, Retrieve handled by a 3d party software

In this RWA Query Client isn't required. The user selects an image in its well known user interface and by a button or menu item (depends on capabilities of the 3d party software) mediCAD will start up with the selected image (by command line parameter). After planning, the result can be exported as DICOM-image into a local directory or store it to one specific PACS system directly. Furthermore, you can handle the planning results with a 3d party software, which should be responsible for watching this exporting folder and managing the stored files.

2.2.2 RWA II – Query, Retrieve, Move, Store with Query Client

Query Client is used to retrieve images and starting mediCAD. Study-Root Query/Retrieve model can be used to initiate query and move requests. In this scenario Query Client also provides a storage service and can sent your planning to the image archive (PACS).

3. AE Specifications

mediCAD never creates images with UIDs equal to source images. Usually exported images are created within a new serie belonging to the same study as the source image. Because mediCAD never is part of a DICOM-communication it has no own AET.

These rules are applied during export:

```
// PART10 Header
{{FileMetaInformationVersion, MED_DCM_VR_OB, T1, ttAdd, 0, _T("01"), 2} // File Meta Information Version
,{MediaStorageSopClassUid, MED_DCM_VR_UI, T1, ttAdd, 0, _T("1.2.840.10008.5.1.4.1.1.7"), ~0u} // Media Storage SOP Class UID
,{MediaStorageSopInstanceUid, MED_DCM_VR_UI, T1, ttGen, 0, 0, 0} // "Media Storage SOP Instance UID"
,{ImplementationClassUid, MED_DCM_VR_UI, T1, ttGlobalIni, _T("AppUID"),0, 0} // Implementation Class UID

// general
// patient
,{GE(0010,0020), MED_DCM_VR_LO, T1, ttCopyAdd, sPI_PID, "", 0 } // PatientID
,{GE(0010,0010), MED_DCM_VR_PN, T2, ttCopyAdd, sPI_PN, "", 0 } // PatientsName
,{GE(0010,0030), MED_DCM_VR_DA, T2, ttCopyAdd, sPI_BirthD, "", 0 } // PatientsBirthDate
,{GE(0010,0040), MED_DCM_VR_CS, T2, ttCopyAdd, sPI_Sex, "", 0 } // PatientsSex
,{GE(0010,1020), MED_DCM_VR_DS, T3, ttCopy, sPI_Height, "", 0 } // PatientsSize
,{GE(0010,1030), MED_DCM_VR_DS, T3, ttCopy, sPI_Weight, "", 0 } // PatientsWeight

// study
,{GE(0020,000D), MED_DCM_VR_UI, T1, ttCopyGenFlagged, sSI_StudyUID, 0, 0 } // StudyInstanceUID
,{GE(0020,0010), MED_DCM_VR_SH, T1, ttCopyAdd, sSI_StudyID, "", ~0u } // StudyID
,{GE(0008,0020), MED_DCM_VR_DA, T2, ttCopyGenFlagged, sSI_StudyCreationD, 0, 0 } // StudyDate
,{GE(0008,0030), MED_DCM_VR_TM, T2, ttCopyGenFlagged, sSI_StudyCreationT, 0, 0 } // StudyTime
,{GE(0008,1030), MED_DCM_VR_LO, T2, ttCopyAdd, _T("#Dcm.StudyDesc"), "", 0 } // StudyDescription
,{GE(0008,0050), MED_DCM_VR_SH, T2, ttCopyAdd, _T("#AccessID"), "", 0 } // Accession Number
,{GE(0008,1050), MED_DCM_VR_PN, T2, ttCopyAdd, sPI_Doc, "", ~0u } // Performing physicans name (=dialog)
,{GE(0008,0090), MED_DCM_VR_PN, T2, ttCopyAdd, _T("#Dcm.RefPhys"), "", 0 } // Referring Physicans Name (from source)

// serie
,{GE(0008,0060), MED_DCM_VR_CS, T1, ttAdd, 0, "OT", 2 } // Modality; also in SC image
,{GE(0008,0021), MED_DCM_VR_DA, T3, ttGen, 0, "yyymmdd", 0 } // Series Date
,{GE(0008,0031), MED_DCM_VR_TM, T3, ttGen, 0, "hhmmss.frac", 0 } // Series Time
,{GE(0020,000E), MED_DCM_VR_UI, T1, ttGen, 0, 0, 0 } // SeriesInstanceUID
,{GE(0020,0011), MED_DCM_VR_IS, T1, ttCopyAdd, sRI_SeriesID, "1", ~0u } // Series Number
,{GE(0020,0011), MED_DCM_VR_IS, T1|AG, ttAdd, 0, "2000", ~0u } // Series Number
,{GE(0008,103E), MED_DCM_VR_LO, T3, ttAppend, sPI_Desc, 0, ~0u } // SeriesDescription // not "SeriesDesc"
,{GE(0018,1030), MED_DCM_VR_LO, T3, ttResource, 0, "@30023", ~0u } // Protocol = series desc
,{GE(0020,0060), MED_DCM_VR_CS, T2, ttAdd, 0, "", 0, 0 } // Laterality get =""
```

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```
// SOP Common
,{GE(0008,0018), MED_DCM_VR_UI, T1, ttGen , 0 , 0,0 } // SOPInstanceUID
,{GE(0008,0016), MED_DCM_VR_UI, T1, ttAdd , 0 , "1.2.840.10008.5.1.4.1.1.7", ~0 } // SOPClassUID = SC
,{GE(0008,0005), MED_DCM_VR_CS, T1C, ttCopy , sGI_CHARSET, "ISO_IR 100", 0 } // Specific Character Set (copy -> cadd)
,{GE(0020,0013), MED_DCM_VR_IS, T1, ttCopyAdd , sII_ImageID , "1", ~0u } // Image Number (=offset + source image number)

// image
,{GE(0008,0008), MED_DCM_VR_CS, T1, ttResource , 0 , "@30022", ~0u } // Image Type // DERIVED\\SECONDARY\\\\DRAWING\\MEDICAD
,{GE(0008,0023), MED_DCM_VR_DA, T2, ttGen , 0 , "yyymmdd",0 } // Image/Content Date
,{GE(0008,0033), MED_DCM_VR_TM, T2, ttGen , 0 , "hhmmss.frac",0} // Image/Content Time
,{GE(0008,0022), MED_DCM_VR_DA, T3, ttCopy , sPI_AcquisitionD, 0 , 0 } // Auqisition Date
,{GE(0008,0032), MED_DCM_VR_TM, T3, ttCopy , sPI_AcquisitionT, 0 , 0 } // Auqisition Time
,{GE(0008,0032), MED_DCM_VR_TM, T3, ttCopy , sPI_AcquisitionDT, 0 , 0 } // Auqisition Time
,{GE(0008,2111), MED_DCM_VR_ST, T3, ttResource, 0 , "@30023", ~0u } // Derivation Description
,{GE(0008,2112), MED_DCM_VR_SQ, T3, ttGen , 0, 0, 0 } // Source Image Sequence (see TTSourceImageSequence)
,{GE(0020,4000), MED_DCM_VR_LT, T3, ttGen , 0 , "@30023", ~0u } // Image Comments
,{GE(0018,1012), MED_DCM_VR_DA, T3, ttGen , 0 , "yyymmdd",0 } // DateOfSecondaryCapture soll= ImageDate
,{GE(0018,1014), MED_DCM_VR_TM, T3, ttGen , 0 , "hhmmss.frac",0} // TimeOfSecondaryCapture soll= ImageTime
,{GE(0028,2110), MED_DCM_VR_CS, T3, ttCopyGen , _T("#Dcm.LossyCompression"), "00", 2} // Lossy Image Compression
,{GE(0020,0020), MED_DCM_VR_CS, T2, ttAdd , 0 , "", 0, } // Patient Orientation =""

// sc image
,{GE(0008,0064), MED_DCM_VR_CS, T1, ttAdd , 0 , "WSD", 3 } // ConversionType
,{GE(0018,1010), MED_DCM_VR_LO, T3, ttRegistry , _T("ComputerName") ,
(LPSTR)_T("HKLM:SYSTEM\\CurrentControlSet\\Control\\ComputerName\\ComputerName"), 0 } // Secondary Capture Device ID
,{GE(0018,1016), MED_DCM_VR_LO, T3, ttResource, 0 , "@4", ~0u } // Sec. Dev Manuf. ?? "Hectec GmbH"
,{GE(0018,1018), MED_DCM_VR_LO, T3|EM|MX, ttRegistry , _T("V1") ,
(LPSTR)_T("HKLM:SOFTWARE\\Siemens\\MedCom\\Config\\Modality\\Global\\SOFTWARE_PRODUCT_NAME"), 0 } // SC Manufacturers Model
Name
,{GE(0018,1019), MED_DCM_VR_LO, T3, ttResource, 0 , "@30031", ~0u } // sw versions

// general equipment
,{GE(0008,0070), MED_DCM_VR_LO, T2, ttResource, 0 , "@4", ~0u } // Manufacturer
,{GE(0008,0080), MED_DCM_VR_LO, T3|EM|MX, ttRegistry , _T("V1") ,
(LPSTR)_T("HKLM:SOFTWARE\\Siemens\\MedCom\\Config\\Site\\Global\\HOSPITAL_NAME"), 0 } // Institution Name
,{GE(0008,0081), MED_DCM_VR_ST, T3|EM|MX, ttGen , _T("COUNTRY(0)")_T("DISTRICT(0)")_T("CITY(0)")_T("ZIP_CODE(0)")_T("STREET(0)")_T("STREET_NUMBER(0)")_T("PHONE_NUMBER(0)")_T("(0)"), (LPSTR)_T("HKLM:SOFTWARE\\Siemens\\MedCom\\Config\\Site\\Global"), 0 } //
Institution Address
,{GE(0008,1010), MED_DCM_VR_SH, T3, ttRegistry , _T("ComputerName") ,
(LPSTR)_T("HKLM:SYSTEM\\CurrentControlSet\\Control\\ComputerName\\ComputerName"), 0 } // Secondary Capture Device ID
,{GE(0008,1090), MED_DCM_VR_LO, T3|EM|MX, ttRegistry , _T("V1") ,
(LPSTR)_T("HKLM:SOFTWARE\\Siemens\\MedCom\\Config\\Modality\\Global\\SOFTWARE_PRODUCT_NAME"), 0 } // Manufacturers Model
Name
,{GE(0018,1000), MED_DCM_VR_LO, T3|EM|MX, ttRegistry , _T("V1") ,
(LPSTR)_T("HKLM:SOFTWARE\\Siemens\\MedCom\\Config\\Site\\Global\\SERIAL_NUMBER"), 0 } // Device Serial nr
,{GE(0018,1020), MED_DCM_VR_LO, T3|EM|MX, ttRegistry , _T("V1") ,
(LPSTR)_T("HKLM:SOFTWARE\\Siemens\\MedCom\\Config\\Modality\\Global\\SOFTWARE_VERSION"), 0 } // Leonardo SW Version
,{0}
```

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3.1 Application Specification

mediCAD and Query Client provide Standard Conformance to the following Storage SOP-classes as SCU

Table 1: SOP CLASSES SUPPORTED BY STORAGE-SCU

SOP Class Name	SOP Class UID
Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.2
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
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
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1
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
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
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 (Retired)	1.2.840.10008.5.1.4.1.1.5
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
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
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
Ultrasound 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
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
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
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
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 Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2

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Query Client provides Standard Conformance to the following Query/Retrieve SOP-Classes:

Table 2: QUERY / RETRIEVE BY SCU

SOP Class Name	SOP Class UID
FIND - Study Root Query Retrieve Information Model	1.2.840.10008.5.1.4.1.2.2.1
MOVE - Study Root Query/Retrieve Information Model	1.2.840.10008.5.1.4.1.2.2.2

Table 3: OVERVIEW – SUPPORTED TRANSFER SYNTAXES

Name	Transfersyntax
Little Endian Implicit	1.2.840.10008.1.2
Little Endian Explicit	1.2.840.10008.1.2.1
Big Endian Explicit	1.2.840.10008.1.2.2
RLE Lossless	1.2.840.10008.1.2.5
JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50
JPEG Extended (Process 2 & 4)	1.2.840.10008.1.2.4.51
JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1])	1.2.840.10008.1.2.4.70
JPEG-LS Lossless	1.2.840.10008.1.2.4.80
JPEG-LS Lossy	1.2.840.10008.1.2.4.81
JPEG 2000 Lossless	1.2.840.10008.1.2.4.90
JPEG 2000 Lossless or Lossy	1.2.840.10008.1.2.4.91

3.2 Association Establishment Policies

3.2.1 General

The configuration of Query Client defines Application Entity Title, Port numbers and acceptable transfer syntaxes (first fit order). On Receive Query Client accepts associations based on a first fit strategy, where the first acceptable transfer syntax is used.

No validation of dataset against IODs is made by Query Client.

Maximum PDU Size is 114kB. (approximately)

3.2.2 Number of Associations

Query Client uses one connection per Role (Store SCU / Query SCU / Move SCU/...).

3.2.3 Asynchronous Nature

Not applicable

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3.2.4 Implementation Identifying Information

Table 4: DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE-SCU

Implementation Class UID	1.3.12.2.1107.5.4.10.100000.1
Implementation Version Name	Hectec DICOM 1.0

3.3 Association Initiation Policy

Query Client initiates a new association on each file it has to transfer. Unencapsulated (little/big endian, implicit/explicit VR) transfer syntaxes are automatically recoded. Encapsulated transfers are rejected if the receiver doesn't accept it. Query Client may initiate associations for C-FIND, C-MOVE or C-STORE operations.

3.3.1 Query / Retrieve handled by 3d party software

This section is not applicable for this RWA.

3.3.2 Query / Retrieve with Query Client – C-FIND

3.3.2.1 Associated RWA

The associated Real-World activity is a C-Find request initiated by the user. The user specifies some attributes. The remote Application should use to query the database. After a successfully established association to the remote Application Entity, it will send one C-Find request according to the query model and will then display the results in Query Client.

3.3.2.2 Proposed Presentation Contexts

All configured transfer syntaxes are combined with selected query/retrieve model and SCU role. No extended negotiation.

3.3.2.3 SOP Specific Conformance Statement

Subsequent queries are used to retrieve level information starting from study/patient down to image level.

Supported attributes at root level:

- Patient's Name (0010,0010)
- Patient's Id (0010,0020)
- Patient's Birthday (0010,0030)

Other required/unique attributes are empty. Optional attributes are part of the C-FIND request if configured.

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3.3.3 Query/Retrieve with Query Client – C-MOVE

3.3.3.1 Associated RWA

The associated Real-World activity is a C-Move request initiated by the user. The user selects an image from a result of a previous C-Find operation. After a successfully established association to the remote Application Entity, it will cause the calling application via a C-Move request to transfer the images to the local Application Entity. The transfer of the images will be done by a subsequent C-Store and will return the results of the store operation to the calling application.

3.3.3.2 Proposed Presentation Contexts

All configured transfer syntaxes are combined with selected query/retrieve model and SCU role. No extended negotiation.

3.3.3.3 SOP Specific Conformance Statement

None.

3.3.4 Query Client automatically stores images in a RAE

3.3.4.1 Associated RWA

The associated Real-World activity is a C-Move request initiated after the user has stored a valid DICOM image in the export folder. After a successfully established association to the remote Application Entity, it will cause the calling application via a C-Store request to transfer the images to the remote Application Entity. The transfer of the images will be done by a subsequent C-Store and will return the results of the store operation to the calling application.

3.3.4.2 Proposed Presentation Contexts

Only the Storage SOP class and transfer syntaxes of the image is proposed. No extended negotiation.

3.3.4.3 SOP Specific Conformance Statement

No IOD validation is applied.

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4. Communication Profiles

4.1 Supported Communication Stacks

The only supported communication is TCP/IP Stack.

4.1.1 TCP/IP Stack

Query Client uses the TCP/IP stack provided by the operating system (Win2000/WinNT/etc.)

5. Extensions/Privatisations/Specialisations

None.

6. Configuration

AETs and Ports are configurable.

7. Extended Character sets

Unsupported.

8. Codes and Controlled Terminology

No Codes and Controlled Terminology are supported.