ImageVision 2.10

DICOM Conformance Statement 1.0

© medigration GmbH
All rights reserved
Table of Contents

1 Introduction ................................................................................................................. 6
  1.1 Purpose .................................................................................................................. 6
  1.2 Scope ..................................................................................................................... 6
  1.3 Definitions, Acronyms and Abbreviations .............................................................. 7
    1.3.1 Definitions ....................................................................................................... 7
    1.3.2 Acronyms and Abbreviations ....................................................................... 7
  1.4 References ............................................................................................................. 7

2 Implementation Model ................................................................................................. 8
  2.1 Application Data Flow Diagram .............................................................................. 9
  2.2 Functional Definition of Application Entities ......................................................... 10
  2.3 Sequencing of Real World Activities .................................................................... 11

3 ImageVision Application Entity Specification .......................................................... 12
  3.1 ImageVision - Specification ................................................................................... 12
    3.1.1 Association Establishment Policies ............................................................... 14
      3.1.1.1 General ................................................................................................... 14
      3.1.1.2 Number of Associations ....................................................................... 14
      3.1.1.3 Implementation Identifying Information ............................................... 15
    3.1.2 Association Initiation Policy ............................................................................ 15
      3.1.2.1 User Initiated Image Send ................................................................. 15
        3.1.2.1.1 Associated Real-World Activity (User Send) ................................ 15
        3.1.2.1.2 Proposed Presentation Contexts .................................................. 15
        3.1.2.1.3 SOP Specific Conformance ......................................................... 16
        3.1.2.1.4 Association Termination .............................................................. 17
      3.1.2.2 Query a Remote Database ...................................................................... 17
        3.1.2.2.1 Associated Real-World Activity (Query Archive) ....................... 17
        3.1.2.2.2 Proposed Presentation Contexts .................................................. 17
        3.1.2.2.3 SOP Specific Conformance ......................................................... 17
        3.1.2.2.4 Association Termination .............................................................. 21
      3.1.2.3 Retrieve DCOs from a Remote Database ............................................... 22
        3.1.2.3.1 Associated Real-World Activity (Retrieve from Archive) ........... 22
        3.1.2.3.2 Proposed Presentation Contexts .................................................. 22
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1.2.3.3 SOP Specific Conformance</td>
<td>22</td>
</tr>
<tr>
<td>3.1.2.4 Print Images</td>
<td>23</td>
</tr>
<tr>
<td>3.1.2.4.1 Associated Real-World Activity (Send PrintJob)</td>
<td>23</td>
</tr>
<tr>
<td>3.1.2.4.2 Proposed Presentation Context</td>
<td>23</td>
</tr>
<tr>
<td>3.1.2.4.3 SOP Specific Conformance</td>
<td>24</td>
</tr>
<tr>
<td>3.1.2.4.4 Association Termination</td>
<td>27</td>
</tr>
<tr>
<td>3.1.3 Association Acceptance Policy</td>
<td>28</td>
</tr>
<tr>
<td>3.1.3.1 Respond to Communication Verification Requests</td>
<td>28</td>
</tr>
<tr>
<td>3.1.3.1.1 Associated Real-World Activity</td>
<td>28</td>
</tr>
<tr>
<td>3.1.3.1.2 Acceptable Presentation Context</td>
<td>28</td>
</tr>
<tr>
<td>3.1.3.1.3 SOP Specific Conformance</td>
<td>28</td>
</tr>
<tr>
<td>3.1.3.1.4 Presentation Context Acceptance Criteria</td>
<td>28</td>
</tr>
<tr>
<td>3.1.3.1.5 Transfer Syntax Selection Policies</td>
<td>29</td>
</tr>
<tr>
<td>3.1.3.2 Receive DCOs for Storage</td>
<td>29</td>
</tr>
<tr>
<td>3.1.3.2.1 Associated Real-World Activity</td>
<td>29</td>
</tr>
<tr>
<td>3.1.3.2.2 Acceptable Presentation Context</td>
<td>29</td>
</tr>
<tr>
<td>3.1.3.2.3 SOP Specific Conformance</td>
<td>29</td>
</tr>
<tr>
<td>3.1.3.2.4 Presentation Context Acceptance Criteria</td>
<td>30</td>
</tr>
<tr>
<td>3.1.3.2.5 Transfer Syntax Selection Policies</td>
<td>30</td>
</tr>
<tr>
<td>3.2 ImageVision FrameGrabber – Specification</td>
<td>31</td>
</tr>
<tr>
<td>3.2.1 Association Establishment Policies</td>
<td>31</td>
</tr>
<tr>
<td>3.2.1.1 General</td>
<td>31</td>
</tr>
<tr>
<td>3.2.1.1.1 Number of Associations</td>
<td>31</td>
</tr>
<tr>
<td>3.2.1.1.2 Implementation Identifying Information</td>
<td>31</td>
</tr>
<tr>
<td>3.2.2 Association Initiation Policy</td>
<td>31</td>
</tr>
<tr>
<td>3.2.2.1 Operator initiated Query Worklist</td>
<td>32</td>
</tr>
<tr>
<td>3.2.2.1.1 Associated Real-World Activity (Query Worklist)</td>
<td>32</td>
</tr>
<tr>
<td>3.2.2.1.2 Proposed Presentation Context</td>
<td>32</td>
</tr>
<tr>
<td>3.2.2.1.3 SOP Specific Conformance</td>
<td>32</td>
</tr>
<tr>
<td>3.2.2.1.4 Association Termination</td>
<td>33</td>
</tr>
<tr>
<td>4 Communication Profiles</td>
<td>37</td>
</tr>
<tr>
<td>4.1 Supported Communication Stacks</td>
<td>37</td>
</tr>
<tr>
<td>4.1.1 TCP/IP Stack</td>
<td>37</td>
</tr>
<tr>
<td>4.1.1.1 Physical Network Media Support</td>
<td>37</td>
</tr>
<tr>
<td>5 Configuration</td>
<td>38</td>
</tr>
</tbody>
</table>
6 Support of Extended Character Sets .................................................. 39
List of Figures

Figure 1: ImageVision Implementation Model ................................................................. 9

List of Tables

Table 1: Supported DICOM Verification SOP Classes and Roles ........................................ 12
Table 2: Supported DICOM Storage SOP Classes and Roles ............................................. 13
Table 3: Supported DICOM Query/Retrieve SOP Classes and Roles .................................. 14
Table 4: Supported DICOM Print Management SOP Classes and Roles ............................. 14
Table 5: Proposed presentation contexts for operator initiated image send .......................... 16
Table 6: Behavior when receiving C-STORE response status codes (operator initiated) ........ 16
Table 7: Proposed presentation contexts for an operator initiated query ............................ 17
Table 8: Supported Study Level Query Keys .................................................................... 18
Table 9: Supported Series Level Query Keys .................................................................... 19
Table 10: Supported Image Level Query Keys ................................................................. 20
Table 11: Supplementary Response Identifier Keys ......................................................... 21
Table 12: Behavior when receiving C-FIND response status codes (operator initiated) ........ 21
Table 13: Proposed presentation contexts for an operator initiated retrieve request ............. 22
Table 14: Behavior when receiving C-FIND response status codes (operator initiated) ........ 23
Table 15: Proposed presentation contexts for an operator initiated print request ................. 24
Table 16: Supported SOP Classes for the Basic Grayscale Print Management Meta SOP Class 24
Table 17: Attributes for the Basic Film Session SOP Class ............................................... 25
Table 18: Attributes for the Basic Film Box SOP Class ..................................................... 26
Table 19: Attributes for the Basic Grayscale Image Box SOP Class .................................. 27
Table 20: Attributes for the Presentation LUT SOP Class .................................................. 27
Table 21: Acceptable presentation context for Verification ................................................ 28
Table 22: Acceptable presentation contexts for storage ..................................................... 29
Table 23: C-STORE response status codes .................................................................... 30
Table 24: Supported DICOM Modality Worklist SOP Classes and Roles ......................... 31
Table 25: Proposed presentation contexts for operator initiated query worklist .................. 32
Table 26: Supported Modality Worklist query keys .......................................................... 33
# 1 Introduction

## 1.1 Purpose

A DICOM Conformance Statement is intended to describe which components, optional components or extensions of the DICOM standard are supported by a particular implementation. The Conformance Statement of one implementation can be compared with the Conformance Statement from another implementation to determine which capabilities are commonly supported.

DICOM does not, by itself, guarantee interoperability. Furthermore, the identification of common capabilities by comparing DICOM Conformance Statements is also not sufficient to guarantee connectivity between two devices.

A DICOM Conformance Statement cannot replace validation and cross-vendor testing with other devices. Validation and cross-vendor testing are still required to ensure that both devices are performing as intended.

The reader should be aware of a number of important issues:

- Even when comparing this Conformance Statement with the Conformance Statement of another device indicates that connectivity is possible, the system integrator is responsible for carrying out test procedures to ensure that the required connectivity is actually met.

- Neither the DICOM Standard nor this Conformance Statement can ensure interoperability when integrating devices from different vendors. It is the system integrator’s responsibility to ensure that the application requirements of all devices within the complete system are met.

- The DICOM standard undergoes continual review and improvement in order to meet changing requirements. Corrections, extensions and additional services are added from time to time. Medigration reserves the right to make changes to the product described in this conformance statement in order to cover changes in the DICOM standard. Readers should be aware that connected devices should also follow changes in the DICOM standard in order to retain connectivity.

The intended audience for this Conformance Statement is hospital technical staff, system integrators and software engineers. The reader is assumed to have good understanding of the DICOM standard.

## 1.2 Scope

This conformance statement describes the DICOM capabilities of the medigration ImageVision. The ImageVision is a diagnostic workstation for medical images. It is specifically designed to be integrated into a DICOM network environment containing Modalities and Archives from different vendors. It supports those DICOM services needed to receive images and other DCOs for display, to query the contents of an DICOM archive, to send images or other DICOM DCOs to another DICOM device
and to print images to a hardcopy device (e.g. film camera).

1.3 Definitions, Acronyms and Abbreviations

1.3.1 Definitions

<table>
<thead>
<tr>
<th>System Integrator</th>
<th>A person or organization responsible for integrating devices into a new or existing system. The System Integrator takes responsibility for ensuring that the system works as a whole.</th>
</tr>
</thead>
</table>

Other definitions can be found within the different parts of the DICOM standard [1].

1.3.2 Acronyms and Abbreviations

<table>
<thead>
<tr>
<th>AE</th>
<th>Application Entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCO</td>
<td><strong>DICOM Composite Object.</strong> A DICOM object such as an image, overlay, lookup-table, waveform, presentation state or radiotherapy plan which can be stored using the Storage Service Class.</td>
</tr>
</tbody>
</table>

Other acronyms and abbreviations used within this document are defined within the different parts of the DICOM standard [1].

1.4 References

[1] DICOM, PS3.(1)-2007, National Electrical Manufacturers Association, 1300 N. 17th Street Rosslyn, Virginia 22209, USA.
2 Implementation Model

The ImageVision is a device for the storage and display of DICOM Composite Objects (DCOs). The objects which can be stored include a wide variety of DICOM images (e.g. CT, MR, US, etc.) and other objects (e.g. presentation states, structured reports, print objects, radiotherapy objects, overlays, waveforms, look-up tables, etc.). The ImageVision software receives DCOs over a network interface, stores them on local magnetic disks and displays them on a monitor for diagnostic purpose. It is also capable of printing the images to a softcopy display and querying and retrieving DCOs from an archive. It maintains a database of summary information about stored objects and allows this database to be queried.

When using the Framegrabber or the FilmScanner option it may also query data from a modality worklist server.
2.1 Application Data Flow Diagram

Figure 1 illustrates the relationships between the ImageVision Application Entity (AE) and its associated Real-World Activities. It also illustrates the relationships of the integrated FrameGrabber and FilmScanner Application Entities (AE) and their Real-World Activities when using the ImageVision FrameGrabber and/or FilmScanner options. The Remote Real-World Activities are shown on the right and the Local Real-World Activities are shown on the left.

**Send to Workstation** is an activity performed by a remote device to send DCOs to the ImageVision to be stored by the **Storage** local activity.

**Query Archive** and **Retrieve from Archive** are local activities performed by the ImageVision to query the database of a remote device and to send orders for
retrieving DCOs. The corresponding activities performed by a remote device are **Query** and **Retrieve**.

Print jobs can be send by the **Send Print Job** local activity to be printed by the **Print** activity on the remote device.

DCOs can be send by the **Send** local activity upon operator request. They are stored by the **Storage** activity on the remote device.

**Echo to Workstation** is an activity performed by a remote device to verify communication with ImageVision. The local activity performed by ImageVision is **Verification**.

**Query Worklist** is a local activity performed by the ImageVision FrameGrabber option to query for patient and study data. The corresponding activity performed by the remote device is **Provide Modality Worklist**.

### 2.2 Functional Definition of Application Entities

The ImageVision software acts as a single Application Entity (AE) providing a general display service for medical images and other related objects. The AE is able to receive images for storage, emit query and retrieve requests and to send images and other objects to remote devices. It also can send print jobs to other devices to generate hardcopies of the images.

The ImageVision acts as an SCU of the following DICOM Service Classes:

- Storage
- Query/Retrieve
- Basic Grayscale Print Management

The ImageVision acts as an SCP of the following DICOM Service Classes:

- Verification
- Storage

The integrated framegrabber or filmscanner option acts as an own Application Entity (AE) which is able to query for worklist data.

The ImageVision FrameGrabber or FilmScanner acts as an SCU for the following DICOM Service Class:

- Modality Worklist

The ImageVision FrameGrabber or FilmScanner does not act as an SCP for any DICOM Service class.
2.3 Sequencing of Real World Activities

No sequencing of Real-World activities are relevant.
3 ImageVision Application Entity Specification

3.1 ImageVision - Specification

The ImageVision provides standard conformance to the Verification Service Class by supporting the SOP Class and roles listed in Table 1.

<table>
<thead>
<tr>
<th>SOP Class Name</th>
<th>UID</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verification</td>
<td>1.2.840.10008.1.1</td>
<td>SCP</td>
</tr>
</tbody>
</table>

Table 1: Supported DICOM Verification SOP Classes and Roles

The ImageVision provides standard conformance to the Storage Service class by supporting the SOP Classes and roles listed in Table 2.

<table>
<thead>
<tr>
<th>SOP Class Name</th>
<th>UID</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computed Radiography Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>CT Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.2</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Hardcopy Color Image Storage</td>
<td>1.2.840.10008.5.1.1.30</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Hardcopy Grayscale Image Storage</td>
<td>1.2.840.10008.5.1.1.29</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>MR Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.4</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Enhanced MR Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.4.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>MR Spectroscopy Storage</td>
<td>1.2.840.10008.5.1.4.1.1.4.2</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Nuclear Medicine Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.20</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Positron Emission Tomography Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.128</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>RT Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.481.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Secondary Capture Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.7</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Multi-frame Single Bit Secondary Capture Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.7.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Multi-frame Grayscale Byte Secondary Capture Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.7.2</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Multi-frame Grayscale Word Secondary Capture Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.7.3</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Multi-frame True Color Secondary Capture Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.7.4</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>SOP Class Name</td>
<td>UID</td>
<td>Role</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Grayscale Softcopy Presentation State Storage</td>
<td>1.2.840.10008.5.1.4.1.1.11.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Ultrasound Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.6.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Ultrasound Multi-frame Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.3.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>X-Ray Angiographic Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.12.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>X-Ray Radiofluoroscopic Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.12.2</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Digital X-Ray Image Storage – For Presentation</td>
<td>1.2.840.10008.5.1.4.1.1.1.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Digital X-Ray Image Storage – For Processing</td>
<td>1.2.840.10008.5.1.4.1.1.1.1.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Digital Mammography X-Ray Image Storage - For Presentation</td>
<td>1.2.840.10008.5.1.4.1.1.1.2</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Digital Mammography X-Ray Image Storage - For Processing</td>
<td>1.2.840.10008.5.1.4.1.1.1.2.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Digital Intra-oral X-Ray Image Storage - For Presentation</td>
<td>1.2.840.10008.5.1.4.1.1.1.3</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Digital Intra-oral X-Ray Image Storage - For Processing</td>
<td>1.2.840.10008.5.1.4.1.1.1.3.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>VL Endoscopic Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.77.1.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>VL Microscopic Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.77.1.2</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>VL Slide-Coordinates Microscopic Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.77.1.3</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>VL Photographic Image Storage</td>
<td>1.2.840.10008.5.1.4.1.1.77.1.4</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Basic Text SR</td>
<td>1.2.840.10008.5.1.4.1.1.88.11</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>12-lead ECG Waveform Storage</td>
<td>1.2.840.10008.5.1.4.1.1.9.1.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>General ECG Waveform Storage</td>
<td>1.2.840.10008.5.1.4.1.1.9.1.2</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Ambulatory ECG Waveform Storage</td>
<td>1.2.840.10008.5.1.4.1.1.9.1.3</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Hemodynamic Waveform Storage</td>
<td>1.2.840.10008.5.1.4.1.1.9.2.1</td>
<td>SCU/SCP</td>
</tr>
<tr>
<td>Cardiac Electrophysiology Waveform Storage</td>
<td>1.2.840.10008.5.1.4.1.1.9.3.1</td>
<td>SCU/SCP</td>
</tr>
</tbody>
</table>

Table 2: Supported DICOM Storage SOP Classes and Roles

The ImageVision provides standard conformance to the Query/Retrieve Service class by supporting the SOP Classes and roles listed in Table 3.
The ImageVision provides standard conformance to the Print Management Service class by supporting the SOP Classes and roles listed in Table 4.

Table 3: Supported DICOM Query/Retrieve SOP Classes and Roles

<table>
<thead>
<tr>
<th>SOP Class Name</th>
<th>UID</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Root Query/Retrieve Information Model – FIND</td>
<td>1.2.840.10008.5.1.4.1.2.2.1</td>
<td>SCU</td>
</tr>
<tr>
<td>Study Root Query/Retrieve Information Model - MOVE</td>
<td>1.2.840.10008.5.1.4.1.2.2.2</td>
<td>SCU</td>
</tr>
</tbody>
</table>

Table 4: Supported DICOM Print Management SOP Classes and Roles

<table>
<thead>
<tr>
<th>SOP Class Name</th>
<th>UID</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Film Session</td>
<td>1.2.840.10008.5.1.1.1</td>
<td>SCU</td>
</tr>
<tr>
<td>Basic Film Box</td>
<td>1.2.840.10008.5.1.1.2</td>
<td>SCU</td>
</tr>
<tr>
<td>Basic Grayscale Image Box</td>
<td>1.2.840.10008.5.1.1.4</td>
<td>SCU</td>
</tr>
<tr>
<td>Printer</td>
<td>1.2.840.10008.5.1.1.16</td>
<td>SCU</td>
</tr>
<tr>
<td>Presentation LUT</td>
<td>1.2.840.10008.5.1.1.23</td>
<td>SCU</td>
</tr>
</tbody>
</table>

### 3.1.1 Association Establishment Policies

#### 3.1.1.1 General

All relevant DICOM communication parameters (AE Titles, hostnames or IP addresses, port numbers, etc.) are configurable. See section 5 for more information on configurable parameters. A maximum PDU size of 16KB will be offered when establishing associations. Any maximum PDU size will be accepted although PDU sizes larger than 64k will never be sent.

#### 3.1.1.2 Number of Associations

The number of concurrent associations which can be accepted is configurable. See section 5 for more information on configurable parameters.

No fixed limit exists on the number of associations which can be initiated other than the resource limits imposed by the underlying operating system. In the following cases associations will be initiated by the ImageVision:

- for sending DCOs by explicit operator action
- to query a database on a remote device
- to retrieve DCOs from a remote device
- to send print jobs to a printer
3.1.1.3 Implementation Identifying Information

<table>
<thead>
<tr>
<th>Implementation Class UID:</th>
<th>1.2.276.0.33.0.19990804.0.1.2 (when sending images to a DICOM printer)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.2.276.0.7230010.3.0.3.5.4 (else)</td>
</tr>
<tr>
<td>Implementation Version Name:</td>
<td>MDCMTK20001123 (when sending images to a DICOM printer)</td>
</tr>
<tr>
<td></td>
<td>OFFIS_DCMTK_354 (else)</td>
</tr>
</tbody>
</table>

3.1.2 Association Initiation Policy

The ImageVision will initiate associations in the following situations:

- When instructed by an operator (via the user interface) to send DCOs to a remote device.
- When instructed by an operator (via the user interface) to send a query request (C-FIND) in order to perform a query on a remote database.
- When instructed by an operator (via the user interface) to send a retrieve request (C-MOVE) in order to retrieve DCOs from a remote device.
- When instructed by an operator (via the user interface) to print images.

3.1.2.1 User Initiated Image Send

3.1.2.1.1 Associated Real-World Activity (User Send)

An operator can - via a graphical user interface - initiate sending images to a remote application entity. The associated local real-world activity is User Send and the remote real world activity is Storage. The operator can select any appropriate grouping of images (e.g. all patient images, all images of specific studies, selected series, individual images, etc.). All selected images will be sent over a single association.

3.1.2.1.2 Proposed Presentation Contexts

One or more presentation contexts will be proposed for user initiated image send as outlined in Table 5. However, only those Storage SOP Classes of images to actually be sent will be proposed (e.g. if only CT images are to be sent then only the CT Image Storage SOP Class will be proposed as an abstract syntax). Each abstract syntax will be proposed within at least 2 presentation contexts using different transfer syntax subsets. The presentation context proposal policy attempts to propose abstract syntax / transfer syntax combinations such that the original transfer syntax of received images can be maintained when sending images. This behavior is intended to eliminate transfer syntax conversion wherever possible.
The presentation context proposal policy can be modified by configuration options so that only the default transfer syntax (Implicit VR Little Endian) is proposed during association negotiation with specific application entities.

<table>
<thead>
<tr>
<th>Abstract Syntax</th>
<th>Transfer Syntax</th>
<th>Role</th>
<th>Extended Negotiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any of the Storage SOP Class names listed in Table 2.</td>
<td>Any of the Storage SOP Class UIDs listed in Table 2.</td>
<td>Explicit VR Little Endian</td>
<td>1.2.840.10008.1.2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Explicit VR Big Endian</td>
<td>1.2.840.10008.1.2.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Implicit VR Little Endian</td>
<td>1.2.840.10008.1.2</td>
</tr>
</tbody>
</table>

Table 5: Proposed presentation contexts for operator initiated image send

3.1.2.1.3 SOP Specific Conformance

The behavior when receiving C-STORE response status codes is shown in Table 6. The operator will be informed by posting a message to the operator’s user interface message area.

<table>
<thead>
<tr>
<th>Status Code</th>
<th>Meaning</th>
<th>Behavior when receiving status code</th>
</tr>
</thead>
<tbody>
<tr>
<td>A7xx</td>
<td>Refused – Out of Resources</td>
<td>The send activity will be terminated (the remaining images will not be sent). An error message will be posted to the operator and an error message recorded in a log file.</td>
</tr>
<tr>
<td>A9xx</td>
<td>Error – Data Set does not match SOP Class</td>
<td>The remaining images will be sent if possible. An error message will be posted to the operator and an error message recorded in a log file.</td>
</tr>
<tr>
<td>Cxxx</td>
<td>Error – Cannot Understand</td>
<td>The operator will be informed after all images have been sent.</td>
</tr>
<tr>
<td>B000</td>
<td>Warning – Coercion of Data Elements</td>
<td></td>
</tr>
<tr>
<td>B007</td>
<td>Warning – Data Set does not match SOP Class</td>
<td></td>
</tr>
<tr>
<td>B006</td>
<td>Warning – Elements Discarded</td>
<td></td>
</tr>
<tr>
<td>0000</td>
<td>Success</td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Behavior when receiving C-STORE response status codes (operator initiated)
Extended negotiation is not supported for the *User Send* Real-World Activity.

All optional attributes included in Storage SOP Instances will be sent as originally received. Storage SOP Instances are stored without modification when received and are not modified when sent. No additional attributes are added.

### 3.1.2.1.4 Association Termination

The association will be released upon receipt of the C-STORE-RSP message for the last sent image or upon receipt of refused or unknown status code.

If the peer AE aborts the association prematurely, all unsent SOP Instances are considered failed.

### 3.1.2.2 Query a Remote Database

#### 3.1.2.2.1 Associated Real-World Activity (Query Archive)

An operator can - via a graphical user interface – query a remote dicom database to have a view on the content of that database. The associated local real-world activity is *Query Archive* and the remote real world activity is *Query*. The user can search the database by entering specific information for Patient Name, Study Date,… or can use wildcards which allow flexible queries.

#### 3.1.2.2.2 Proposed Presentation Contexts

<table>
<thead>
<tr>
<th>Abstract Syntax</th>
<th>Transfer Syntax</th>
<th>Role</th>
<th>Extended Negotiation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td><strong>UID</strong></td>
<td><strong>Name</strong></td>
<td><strong>UID</strong></td>
</tr>
<tr>
<td>Study Root Query/Retrieve Model - FIND</td>
<td>1.2.840.10008.5.1.4.1.2.2.1</td>
<td>Implicit VR</td>
<td>1.2.840.10008.1.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LittleEndian</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Explicit VR</td>
<td>1.2.840.10008.1.2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LittleEndian</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Explicit VR</td>
<td>1.2.840.10008.1.2.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Big Endian</td>
<td></td>
</tr>
</tbody>
</table>

Table 7: Proposed presentation contexts for an operator initiated query

#### 3.1.2.2.3 SOP Specific Conformance

Standard conformance is provided for the C-FIND SOP Class. Priority processing is not supported. Relational queries are not supported.
ImageVision supports all query keys listed in Table 8, Table 9 and Table 10. The tables also indicate if the attribute is supported as a matching key. For these matching keys the user can enter values via the user interface.

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Tag</th>
<th>Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient’s Name</td>
<td>(0010,0010)</td>
<td>✓</td>
</tr>
<tr>
<td>Patient ID</td>
<td>(0010,0020)</td>
<td>✓</td>
</tr>
<tr>
<td>Patient’s Birth Date</td>
<td>(0010,0030)</td>
<td>✓</td>
</tr>
<tr>
<td>Patient’s Sex</td>
<td>(0010,0040)</td>
<td></td>
</tr>
<tr>
<td>Number of Patient Related Studies</td>
<td>(0020,1200)</td>
<td></td>
</tr>
<tr>
<td>Number of Patient Related Series</td>
<td>(0020,1202)</td>
<td></td>
</tr>
<tr>
<td>Number of Patient Related Instances</td>
<td>(0020,1204)</td>
<td></td>
</tr>
<tr>
<td>Study Date</td>
<td>(0008,0020)</td>
<td>✓</td>
</tr>
<tr>
<td>Study Time</td>
<td>(0008,0030)</td>
<td>✓</td>
</tr>
<tr>
<td>Accession Number</td>
<td>(0008,0050)</td>
<td>✓</td>
</tr>
<tr>
<td>Study ID</td>
<td>(0020,0010)</td>
<td>✓</td>
</tr>
<tr>
<td>Study Instance UID</td>
<td>(0020,000D)</td>
<td>✓</td>
</tr>
<tr>
<td>Referring Physician’s Name</td>
<td>(0008,0090)</td>
<td>✓</td>
</tr>
<tr>
<td>Modalities in Study</td>
<td>(0008,0061)</td>
<td>✓</td>
</tr>
<tr>
<td>Study Description</td>
<td>(0008,1030)</td>
<td></td>
</tr>
<tr>
<td>Number of Study Related Series</td>
<td>(0020,1206)</td>
<td></td>
</tr>
<tr>
<td>Number of Study Related Instances</td>
<td>(0020,1208)</td>
<td></td>
</tr>
</tbody>
</table>

Table 8: Supported Study Level Query Keys

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Tag</th>
<th>Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modality</td>
<td>(0008,0060)</td>
<td>✓</td>
</tr>
<tr>
<td>Series Number</td>
<td>(0020,0011)</td>
<td>✓</td>
</tr>
<tr>
<td>Series Instance UID</td>
<td>(0020,000E)</td>
<td>✓</td>
</tr>
<tr>
<td>Body Part Examined</td>
<td>(0018,0015)</td>
<td></td>
</tr>
<tr>
<td>Series Description</td>
<td>(0008,103E)</td>
<td></td>
</tr>
<tr>
<td>Request Attribute Sequence</td>
<td>(0040,0275)</td>
<td>✓</td>
</tr>
<tr>
<td>&gt; Requested Procedure ID</td>
<td>(0040,1001)</td>
<td>✓</td>
</tr>
<tr>
<td>&gt; Scheduled Procedure Step ID</td>
<td>(0040,0009)</td>
<td>✓</td>
</tr>
<tr>
<td>Attribute Name</td>
<td>Tag</td>
<td>Matching</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Performed Procedure Step Start Date</strong></td>
<td>(0040,0244)</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Performed Procedure Step Start Time</strong></td>
<td>(0040,0245)</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Number of Series Related Images</strong></td>
<td>(0020,1209)</td>
<td></td>
</tr>
</tbody>
</table>

Table 9: Supported Series Level Query Keys

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Tag</th>
<th>Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Image Level Query Keys</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instance Number</td>
<td>(0020,0013)</td>
<td>✓</td>
</tr>
<tr>
<td>SOP Class UID</td>
<td>(0008,0016)</td>
<td></td>
</tr>
<tr>
<td>SOP Instance UID</td>
<td>(0008,0018)</td>
<td>✓</td>
</tr>
<tr>
<td>Content Date</td>
<td>(0008,0023)</td>
<td></td>
</tr>
<tr>
<td>Content Time</td>
<td>(0008,0033)</td>
<td></td>
</tr>
<tr>
<td>Number of Frames</td>
<td>(0028,0008)</td>
<td></td>
</tr>
<tr>
<td>Bits Allocated</td>
<td>(0028,0100)</td>
<td></td>
</tr>
<tr>
<td>Rows</td>
<td>(0028,0010)</td>
<td></td>
</tr>
<tr>
<td>Columns</td>
<td>(0028,0011)</td>
<td></td>
</tr>
<tr>
<td>Observation DateTime</td>
<td>(0040,A032)</td>
<td></td>
</tr>
<tr>
<td><strong>Image Level Query Keys for Presentation State</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation Label</td>
<td>(0070,0080)</td>
<td></td>
</tr>
<tr>
<td>Presentation Description</td>
<td>(0070,0081)</td>
<td></td>
</tr>
<tr>
<td>Presentation Creation Date</td>
<td>(0070,0082)</td>
<td></td>
</tr>
<tr>
<td>Presentation Creation Time</td>
<td>(0070,0083)</td>
<td></td>
</tr>
<tr>
<td>Presentation Creator’s Name</td>
<td>(0070,0084)</td>
<td></td>
</tr>
<tr>
<td>Referenced Series Sequence</td>
<td>(0008,1115)</td>
<td></td>
</tr>
<tr>
<td>&gt; Series Instance UID</td>
<td>(0020,000E)</td>
<td></td>
</tr>
<tr>
<td>&gt; Referenced Image Sequence</td>
<td>(0008,1140)</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; Referenced SOP Class UID</td>
<td>(0008,1150)</td>
<td></td>
</tr>
<tr>
<td>&gt;&gt; Referenced SOP Instance UID</td>
<td>(0008,1155)</td>
<td></td>
</tr>
<tr>
<td><strong>Image Level Query Keys for Structured Report and Key Image Notes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completion Flag</td>
<td>(0040,A491)</td>
<td>✓</td>
</tr>
<tr>
<td>Verification Flag</td>
<td>(0040,A493)</td>
<td>✓</td>
</tr>
<tr>
<td>Verifying Observer Sequence</td>
<td>(0040,A073)</td>
<td>✓</td>
</tr>
</tbody>
</table>
Table 10: Supported Image Level Query Keys

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Tag</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Character Set</td>
<td>(0008,0005)</td>
<td>Ignored</td>
</tr>
<tr>
<td>Retrieve AE Title</td>
<td>(0008,0054)</td>
<td></td>
</tr>
<tr>
<td>Storage Media File-Set UID</td>
<td>(0008,0140)</td>
<td></td>
</tr>
<tr>
<td>Storage Media File-Set ID</td>
<td>(0008,0130)</td>
<td>The Instance Availability (ONLINE,</td>
</tr>
</tbody>
</table>

The C-FIND response identifier can contain, in addition to the requested key attributes and the current query/retrieve level, the supplementary attributes listed in Table 11.
The meaning of status codes which can be returned in a C-FIND response are listed in Table 12. More detailed error information may be provided in the related fields Offending Element (0000, 0901) and Error Comment (0000,0902).

The behavior when receiving C-FIND response status codes is shown in Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden. Table 12. The operator will be informed by posting a message to the operator’s user interface message area.

Extended negotiation is not supported for the Query Archive Real-World Activity.

### 3.1.2.2.4 Association Termination

The association will be released upon receipt of a C-FIND-RSP message with a non-pending status.
3.1.2.3 Retrieve DCOs from a Remote Database

3.1.2.3.1 Associated Real-World Activity (Retrieve from Archive)

An operator can - via a graphical user interface – retrieve DCOs from a remote dicom database to display the DCOs for the user. The associated local real-world activity is Retrieve from Archive and the remote real world activity is Retrieve. The user can send a retrieve request by selecting a patient, a study a series or an image from the user interface.

3.1.2.3.2 Proposed Presentation Contexts

<table>
<thead>
<tr>
<th>Abstract Syntax</th>
<th>Transfer Syntax</th>
<th>Role</th>
<th>Extended Negotiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>UID</td>
<td>Name</td>
<td>UID</td>
</tr>
<tr>
<td>Study Root Query/Retrieve Model - MOVE</td>
<td>1.2.840.10008.5.1.4.1.2.2.2</td>
<td>Implicit VR Little Endian</td>
<td>1.2.840.10008.1.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Explicit VR Little Endian</td>
<td>1.2.840.10008.1.2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Explicit VR Big Endian</td>
<td>1.2.840.10008.1.2.2</td>
</tr>
</tbody>
</table>

Table 13: Proposed presentation contexts for an operator initiated retrieve request

3.1.2.3.3 SOP Specific Conformance

The behavior when receiving C-MOVE response status codes is shown in Table 14. The operator will be informed that the DCOs arrived. The DCOs will be displayed in the user interface of the local database.
<table>
<thead>
<tr>
<th>Status Code</th>
<th>Meaning</th>
<th>Behavior when receiving status code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Any other status code not included in this table</td>
<td>An error message will be posted to the operator and an error message recorded in a log file.</td>
</tr>
<tr>
<td>A700</td>
<td>Refused – Out of Resources Number of Matches</td>
<td></td>
</tr>
<tr>
<td>A701</td>
<td>Refused – Out of Resources Sub-Operations</td>
<td></td>
</tr>
<tr>
<td>A800</td>
<td>Refused – SOP Class not supported</td>
<td></td>
</tr>
<tr>
<td>A801</td>
<td>Failed – Move Destination unknown</td>
<td></td>
</tr>
<tr>
<td>A9xx</td>
<td>Failed – Identifier does not match SOP Class</td>
<td></td>
</tr>
<tr>
<td>C000</td>
<td>Failed – Unable to process</td>
<td></td>
</tr>
<tr>
<td>B000</td>
<td>Warning – Sub-Operations Complete One Or More Failures</td>
<td>The DCOs retrieved from the SCP appear in the local database.</td>
</tr>
<tr>
<td>FE00</td>
<td>Cancel – Sub-Operations Terminated Due To Cancel Indication</td>
<td></td>
</tr>
<tr>
<td>0000</td>
<td>Success</td>
<td></td>
</tr>
</tbody>
</table>

Table 14: Behavior when receiving C-FIND response status codes (operator initiated)

Extended negotiation is not supported for the *Retrieve From Archive* Real-World Activity.

### 3.1.2.4 Print Images

#### 3.1.2.4.1 Associated Real-World Activity (Send PrintJob)

The user can select a set of images to be printed to a remote dicom printer. The resulting hardcopy can be printed on transmissive (film) or reflective (paper) media. The associated local real-world activity is **Send PrintJob** and the remote real world activity is **Print**.

#### 3.1.2.4.2 Proposed Presentation Contexts
### 3.1.2.4.3 SOP Specific Conformance

ImageVision supports the SOP Classes listed in Table 16 as defined by the Basic Grayscale Print Management Meta SOP Class.

<table>
<thead>
<tr>
<th>SOP Class Name</th>
<th>SOP Class UID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Film Session</td>
<td>1.2.840.10008.5.1.1.1</td>
</tr>
<tr>
<td>Basic Film Box</td>
<td>1.2.840.10008.5.1.1.2</td>
</tr>
<tr>
<td>Basic Grayscale Image Box</td>
<td>1.2.840.10008.5.1.1.4</td>
</tr>
<tr>
<td>Printer</td>
<td>1.2.840.10008.5.1.1.16</td>
</tr>
</tbody>
</table>

Table 16: Supported SOP Classes for the Basic Grayscale Print Management Meta SOP Class

Extended negotiation is not supported for the *Send PrintJob* Real-World Activity.

#### 3.1.2.4.3.1 Conformance for Basic Film Session SOP Class

ImageVision includes the attributes from Table 17 in the N-CREATE request for the Basic Film Session SOP Class.
The N-SET and N-ACTION commands for the Basic Film Session SOP Class are unused. The N-DELETE command is used to delete the Film Session after all Film Boxes have been deleted.

### 3.1.2.4.3.2 Conformance for Basic Film Box SOP Class

ImageVision includes the attributes from Table 18 in the N-CREATE request for the Basic Film Box SOP Class.
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Tag</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image Display Format</td>
<td>(2010,0010)</td>
<td>STANDARD\1,1</td>
</tr>
<tr>
<td>Referenced Film Session Sequence</td>
<td>(2010,0500)</td>
<td></td>
</tr>
<tr>
<td>&gt; Referenced SOP Class UID</td>
<td>(0008,1150)</td>
<td></td>
</tr>
<tr>
<td>&gt; Referenced SOP Instance UID</td>
<td>(0008,1155)</td>
<td></td>
</tr>
<tr>
<td>Film Orientation</td>
<td>(2010,0040)</td>
<td>PORTRAIT</td>
</tr>
<tr>
<td>Film Size ID</td>
<td>(2010,0050)</td>
<td></td>
</tr>
<tr>
<td>Magnification Type</td>
<td>(2010,0060)</td>
<td>&lt;configurable&gt;</td>
</tr>
<tr>
<td>Max Density</td>
<td>(2010,0130)</td>
<td>&lt;configurable&gt;</td>
</tr>
<tr>
<td>Smoothing Type</td>
<td>(2010,0080)</td>
<td>&lt;configurable&gt;</td>
</tr>
<tr>
<td>Border Density</td>
<td>(2010,0100)</td>
<td>&lt;configurable&gt;</td>
</tr>
<tr>
<td>Empty Image Density</td>
<td>(2010,0110)</td>
<td>&lt;configurable&gt;</td>
</tr>
<tr>
<td>Min Density</td>
<td>(2010,0120)</td>
<td>&lt;configurable&gt;</td>
</tr>
<tr>
<td>Trim</td>
<td>(2010,0140)</td>
<td>&lt;configurable&gt;</td>
</tr>
<tr>
<td>Referenced Presentation LUT Sequence</td>
<td>(2050,0500)</td>
<td>Will be sent if the Presentation LUT SOP Class was negotiated and a Presentation LUT SOP instance has successfully been created.</td>
</tr>
<tr>
<td>&gt; Referenced SOP Class UID</td>
<td>(0008,1150)</td>
<td></td>
</tr>
<tr>
<td>&gt; Referenced SOP Instance UID</td>
<td>(0008,1155)</td>
<td></td>
</tr>
</tbody>
</table>

Table 18: Attributes for the Basic Film Box SOP Class

The N-SET and N-ACTION commands for the Basic Film Box SOP Class are unused. The N-DELETE command is used to delete the Film Box with all Image Boxes managed by the Film Box.

3.1.2.4.3.3 Conformance for the Basic Grayscale Image Box SOP Class

ImageVision includes the attributes from Table 19 in the N-CREATE request for the Basic Grayscale Image Box SOP Class.
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Tag</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>ImagePosition</td>
<td>(2020,0010)</td>
<td>1</td>
</tr>
<tr>
<td>Basic Grayscale Image Sequence</td>
<td>(2020,0110)</td>
<td>Only a single item is present.</td>
</tr>
<tr>
<td>&gt; Samples Per Pixel</td>
<td>(0028,0002)</td>
<td>1</td>
</tr>
<tr>
<td>&gt; Photometric Interpretation</td>
<td>(0028,0004)</td>
<td></td>
</tr>
<tr>
<td>&gt; Rows</td>
<td>(0028,0010)</td>
<td>Depends on the resolution of the display device. Configurable.</td>
</tr>
<tr>
<td>&gt; Columns</td>
<td>(0028,0011)</td>
<td>Depends on the resolution of the display device. Configurable.</td>
</tr>
<tr>
<td>&gt; Pixel Aspect Ratio</td>
<td>(0028,0034)</td>
<td></td>
</tr>
<tr>
<td>&gt; Bits Allocated</td>
<td>(0028,0100)</td>
<td>8</td>
</tr>
<tr>
<td>&gt; Bits Stored</td>
<td>(0028,0101)</td>
<td>8</td>
</tr>
<tr>
<td>&gt; High Bit</td>
<td>(0028,0102)</td>
<td>7</td>
</tr>
<tr>
<td>&gt; Pixel Representation</td>
<td>(0028,0103)</td>
<td>0</td>
</tr>
<tr>
<td>&gt; Pixel Data</td>
<td>(7FE0,0010)</td>
<td></td>
</tr>
</tbody>
</table>

Table 19: Attributes for the Basic Grayscale Image Box SOP Class

The N-SET and N-ACTION commands for the Basic Grayscale Image Session SOP Class are unused.

3.1.2.4.3.4 Conformance for Presentation LUT SOP Class

ImageVision includes the attributes from Table 20 in the N-CREATE request for the Presentation LUT SOP Class.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Tag</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation LUT Shape</td>
<td>(2050,0010)</td>
<td>IDENTITY</td>
</tr>
</tbody>
</table>

Table 20: Attributes for the Presentation LUT SOP Class

The N-SET and N-ACTION commands for the Presentation LUT SOP Class are unused. The N-DELETE command is used to delete the Presentation LUT for the current Basic Film Box or Film Session.

3.1.2.4.4 Association Termination

The association will be released upon receipt of the N-DELETE-RSP of the Basic Film Session.
3.1.3 Association Acceptance Policy

The ImageVision application will accept associations for the following situations:

- To respond to communication verification requests from remote devices.
- To receive DCOs for storage from remote devices.

Associations can be accepted at any time the ImageVision application entity is active. The ImageVision application entity may not be active if stopped or restarted by an operator.

Associations will be terminated (A-ABORT) if they are idle for more than 20 minutes.

3.1.3.1 Respond to Communication Verification Requests

3.1.3.1.1 Associated Real-World Activity

An association will be accepted from a remote Application Entity in order to respond to communication verification requests. The local real-world activity is Verification and the remote real world activity is Echo to Workstation.

3.1.3.1.2 Acceptable Presentation Contexts

Any of the presentation contexts shown in Table 21 can be accepted.

<table>
<thead>
<tr>
<th>Abstract Syntax</th>
<th>Transfer Syntax</th>
<th>Role</th>
<th>Extended Negotiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name</td>
<td>UID</td>
<td>UID</td>
</tr>
<tr>
<td>Verification</td>
<td>Implicit VR</td>
<td>1.2.840.10008.1.1</td>
<td>SCP</td>
</tr>
<tr>
<td></td>
<td>Little Endian</td>
<td>1.2.840.10008.1.2</td>
<td></td>
</tr>
</tbody>
</table>

Table 21: Acceptable presentation context for Verification

3.1.3.1.3 SOP Specific Conformance

Standard conformance is provided for the Verification SOP Class.

3.1.3.1.4 Presentation Context Acceptance Criteria

A presentation context for the Verification SOP Class will always be accepted provided the transfer syntax selection policy is met. Presentation contexts for other supported activities may also be accepted on the same association.
3.1.3.1.5 Transfer Syntax Selection Policies

Only the default DICOM Transfer Syntax (Implicit VR Little Endian) will be accepted.

3.1.3.2 Receive DCOs for Storage

3.1.3.2.1 Associated Real-World Activity

An association will be accepted from a remote Application Entity in order to receive images for storage. The local real-world activity is Storage and the remote real world activity is Send to Workstation.

Received images are stored on local disk, summary information extracted from the image and inserted in a central database. The extraction of summary information is tolerant of encoding errors wherever possible. Invalid attribute values will be retained in the image files but may be ignored or truncated when inserted into the central database.

3.1.3.2.2 Acceptable Presentation Contexts

Any of the presentation contexts shown in Table 22 can be accepted.

<table>
<thead>
<tr>
<th>Abstract Syntax</th>
<th>Transfer Syntax</th>
<th>Role</th>
<th>Extended Negotiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Name</td>
<td>UID</td>
<td></td>
</tr>
<tr>
<td>Any of the</td>
<td>Explicit VR</td>
<td>1.2.840.10008.1.2.1 SCP None</td>
<td></td>
</tr>
<tr>
<td>Storage SOP</td>
<td>Little Endian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class names</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>listed in Table</td>
<td>Explicit VR</td>
<td>1.2.840.10008.1.2.2 SCP None</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Big Endian</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implicit VR</td>
<td>1.2.840.10008.1.2 SCP None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Little Endian</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 22: Acceptable presentation contexts for storage

3.1.3.2.3 SOP Specific Conformance

Conformance to the SOP Classes of the Storage Service Class is at Level 2 (Full). Moreover, all received attributes (Type 1, Type 2, Type 3 and Private) are stored without modification. No attributes are discarded. Received images are written to local disk using the DICOM File Format as specified in PS 3.10. The identity of the transfer syntax used to receive the image is recorded in the File Format meta header along with the Source Application Entity Title.

No specific policies are required concerning the attribute Lossy Image Compression
(0028,2110).
No automatic coercion of attribute values will be performed.
If a success or warning status is returned in a C-STORE response the image has been stored to local disk and registered in the central database. If an image is received containing a SOP Instance UID which is already stored in the database then a success status is returned and the image is updated.
The meaning of status codes which can be returned in a C-STORE response are listed in Table 23. More detailed error information may be provided in the related fields Offending Element (0000, 0901) and Error Comment (0000,0902).

<table>
<thead>
<tr>
<th>Status Code</th>
<th>Meaning</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>A700</td>
<td>Refused – Out of Resources</td>
<td>Insufficient disk space is available or insufficient permissions exist to store the image. The image cannot be stored. An error message is recorded in a log file.</td>
</tr>
<tr>
<td>A900</td>
<td>Error – Data Set does not match SOP Class</td>
<td>A serious incompatibility between the dataset and the supposed SOP Class was detected. The image cannot be stored. An error message is recorded in a log file.</td>
</tr>
<tr>
<td>C000</td>
<td>Error – Cannot Understand</td>
<td>A serious error occurred while parsing the image or an error occurred while updating the database. The image cannot be stored. An error message is recorded in a log file.</td>
</tr>
<tr>
<td>0000</td>
<td>Success</td>
<td>The image has been successfully stored or an image with the same SOP Instance UID already exists. A message is recorded in a log file.</td>
</tr>
</tbody>
</table>

Table 23: C-STORE response status codes

3.1.3.2.4 Presentation Context Acceptance Criteria
Presentation contexts for any of the supported Storage SOP Classes will always be accepted provided the transfer syntax selection policy is met. Presentation contexts for other supported activities may also be accepted on the same association.

3.1.3.2.5 Transfer Syntax Selection Policies
Preference is by default given to receiving images encoded using an explicit transfer syntax. However, configuration options can be used to limit acceptance to only the default DICOM Transfer Syntax (Implicit VR Little Endian) when accepting
associations from specific application entities (see section 5 for configuration options).

When multiple Transfer Syntaxes are presented, a selection is made using following priority:

1. Explicit VR Little Endian
2. Explicit VR Big Endian
3. Implicit VR Little Endian

### 3.2 ImageVision FrameGrabber – Specification

The ImageVision FrameGrabber provides standard conformance to the Modality Worklist Service Class by supporting the SOP Class and roles listet in Table 24.

<table>
<thead>
<tr>
<th>SOP Class Name</th>
<th>UID</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modality Worklist Information Model - FIND</td>
<td>1.2.840.10008.5.1.4.31</td>
<td>SCU</td>
</tr>
</tbody>
</table>

Table 24: Supported DICOM Modality Worklist SOP Classes and Roles

### 3.2.1 Association Establishment Policies

#### 3.2.1.1 General

All relevant DICOM communication parameters (AE Title, hostnames or IP addresses, port numbers etc.) are configurable. See section 5 for more information on configurable parameters. A maximum PDU size of 16 kB will be offered when establishing associations.

#### 3.2.1.1.1 Number of Associations

There will be only one association at any time for the ImageVision FrameGrabber Application Entity.

#### 3.2.1.2 Implementation Identifying Information

<table>
<thead>
<tr>
<th>Implementation Class UID:</th>
<th>1.2.276.0.7230010.3.0.3.5.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation Version Name:</td>
<td>OFFIS_DCMTK_354</td>
</tr>
</tbody>
</table>

### 3.2.2 Association Initiation Policy

The ImageVision FrameGrabber will initiate an association when the modality worklist
option is enabled and the framegrabber dialog panel is accessed by the operator. This association is kept until the operator leaves the framegrabber dialog panel. All modality worklist queries during a framegrabber session are sent through this association.

### 3.2.2.1 Operator initiated Query Worklist

#### 3.2.2.1.1 Associated Real-World Activity (Query Worklist)

An operator initiates a query for modality worklist data through its graphical user interface. The associated local Real-World Activity is **Query Worklist** and the remote Real-World Activity is **Provide Modality Worklist**. All modality worklist queries during a framegrabber session will be sent through the same association.

#### 3.2.2.1.2 Proposed Presentation Contexts

One or more presentation contexts will be proposed for **operator initiated query worklist** as outlined in Table 25. There is no special policy for proposing Abstract Syntax / Transfer Syntax pairs.

<table>
<thead>
<tr>
<th>Abstract Syntax</th>
<th>Transfer Syntax</th>
<th>Role</th>
<th>Extended Negotiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modality Worklist Information Model - FIND</td>
<td>Explicit VR Little Endian</td>
<td>SCU</td>
<td>None</td>
</tr>
<tr>
<td>1.2.840.10008.5.1.4.31</td>
<td>1.2.840.10008.1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explicit VR Big Endian</td>
<td>SCU</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>1.2.840.10008.1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implicit VR Little Endian</td>
<td>SCU</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>1.2.840.10008.1.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 25: Proposed presentation contexts for operator initiated query worklist

#### 3.2.2.1.3 SOP Specific Conformance

Standard conformance is provided for the Modality Worklist Information Model - FIND SOP Class.

ImageVision FrameGrabber supports all query keys listed in Table 26. The table also indicates if the listed attribute is supported as a query key or as a return key (if an attribute has no entry in the “Matching” column it is used as a return key).
### Table 26: Supported Modality Worklist query keys

If receiving an C-FIND response all requested keys are extracted from the returned dataset. If a requested key is missing, it is ignored. Any additional return keys that have not been requested are ignored. Any C-FIND response status codes are ignored.

#### 3.2.2.1.4 Association Termination

The association will be released when the operator leaves the framegrabber dialog panel.

### 3.3 ImageVision FilmScanner – Specification

The ImageVision FilmScanner provides standard conformance to the Modality Worklist Service Class by supporting the SOP Class and roles listet in Table 24.

<table>
<thead>
<tr>
<th>SOP Class Name</th>
<th>UID</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modality Worklist Information Model - FIND</td>
<td>1.2.840.10008.5.1.4.31</td>
<td>SCU</td>
</tr>
</tbody>
</table>

Table 27: Supported DICOM Modality Worklist SOP Classes and Roles
3.3.1 Association Establishment Policies

3.3.1.1 General

All relevant DICOM communication parameters (AE Title, hostnames or IP addresses, port numbers etc.) are configurable. See section 5 for more information on configurable parameters. A maximum PDU size of 16 kB will be offered when establishing associations.

3.3.1.1.1 Number of Associations

There will be only one association at any time for the ImageVision FilmScanner Application Entity.

3.3.1.2 Implementation Identifying Information

| Implementation Class UID:                  | 1.2.276.0.7230010.3.0.3.5.4 |
| Implementation Version Name:               | OFFIS_DCMTK_354 |

3.3.2 Association Initiation Policy

The ImageVision FilmScanner will initiate an association when the modality worklist option is enabled and the filmscanner dialog panel is accessed by the operator. This association is kept until the operator leaves the filmscanner dialog panel. All modality worklist queries during a filmscanner session are sent through this association.

3.3.2.1 Operator initiated Query Worklist

3.3.2.1.1 Associated Real-World Activity (Query Worklist)

An operator initiates a query for modality worklist data through its graphical user interface. The associated local Real-World Activity is Query Worklist and the remote Real-World Activity is Provide Modality Worklist. All modality worklist queries during a filmscanner session will be sent through the same association.

3.3.2.1.2 Proposed Presentation Contexts

One or more presentation contexts will be proposed for operator initiated query worklist as outlined in Table 25. There is no special policy for proposing Abstract Syntax / Transfer Syntax pairs.
### 3.3.2.1.3 SOP Specific Conformance

Standard conformance is provided for the Modality Worklist Information Model - FIND SOP Class.

ImageVision FilmScanner supports all query keys listed in Table 26. The table also indicates if the listed attribute is supported as a query key or as a return key (if an attribute has no entry in the “Matching” column it is used as a return key).

<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Tag</th>
<th>Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduled Procedure Step Sequence</td>
<td>(0040, 0100)</td>
<td></td>
</tr>
<tr>
<td>&gt;Scheduled Station AE Title</td>
<td>(0040, 0001)</td>
<td>✓</td>
</tr>
<tr>
<td>&gt;Scheduled Procedure Step Start Date</td>
<td>(0040, 0002)</td>
<td>✓</td>
</tr>
<tr>
<td>&gt;Scheduled Procedure Step Start Time</td>
<td>(0040, 0003)</td>
<td>✓</td>
</tr>
<tr>
<td>&gt;Modality</td>
<td>(0008, 0060)</td>
<td>✓</td>
</tr>
<tr>
<td>Study Instance UID</td>
<td>(0020, 000D)</td>
<td></td>
</tr>
<tr>
<td>Accession Number</td>
<td>(0008, 0050)</td>
<td></td>
</tr>
<tr>
<td>Referring Physician’s Name</td>
<td>(0008, 0090)</td>
<td></td>
</tr>
<tr>
<td>Patient’s Name</td>
<td>(0010, 0010)</td>
<td></td>
</tr>
<tr>
<td>Patient ID</td>
<td>(0010, 0020)</td>
<td></td>
</tr>
<tr>
<td>Patients Birth Date</td>
<td>(0010, 0030)</td>
<td></td>
</tr>
<tr>
<td>Patient’s Sex</td>
<td>(0010, 0040)</td>
<td></td>
</tr>
<tr>
<td>Study Description</td>
<td>(0008, 1030)</td>
<td></td>
</tr>
<tr>
<td>Study Date</td>
<td>(0008, 0020)</td>
<td></td>
</tr>
</tbody>
</table>
Table 29: Supported Modality Worklist query keys

If receiving an C-FIND response all requested keys are extracted from the returned dataset. If a requested key is missing, it is ignored. Any additional return keys that have not been requested are ignored. Any C-FIND response status codes are ignored.

3.3.2.1.4 Association Termination

The association will be released when the operator leaves the filmscanner dialog panel.
4 Communication Profiles

4.1 Supported Communication Stacks

TCP/IP Network Communication is supported as defined in PS 3.8.

4.1.1 TCP/IP Stack

The TCP/IP stack is inherited from the underlying operating system.

4.1.1.1 Physical Network Media Support

No dependency exists on the physical network medium over which TCP/IP executes. The supported physical network media are inherited from the underlying operating system.
5 Configuration

The following DICOM-related network parameters are configurable by the user via a graphical user interface and are stored in the local database:

- The title of the ImageVision Application Entity. Associations will not be accepted if the Called AE Title is not equal to the configured AE Title (this behaviour may be switched off by a field service engineer, see below).
- The title of the ImageVision FrameGrabber and/or FilmScanner Application Entity (FrameGrabber and FilmScanner use the same AET).
- The Port Number to use when listening for associations (default 104).
- The AE Titles, IP Address and Port Number for all peer application entities. These parameters must be configured before associations can be initiated or accepted. Association attempts from unknown AE Title and IP Address pairs will not be accepted (this behaviour may be switched off by a field service engineer, see below).
- Support by peer application entities for the Verification SOP Class. If supported, a connectivity test can be performed upon user request.
- The preferred transfer syntax for each peer application entity. The transfer syntax selection policies can be configured such that only the Implicit VR Little Endian Transfer Syntax will be accepted for individual application entities.

The following DICOM-related network parameters are configurable by a field service engineer for the Storage, Query/Retrieve, Retrieval Send, Echo Provider, Get Storage Commitment and Get MPPS local activities:

- The number of concurrent associations which can be accepted (default 20). This limit is bound only by the availability of underlying operating system resources.
- General association inactivity timeout (default 1800 seconds).
- Timeout waiting for a DIMSE request (default 1200 seconds).
- Timeout waiting for a DIMSE response (default 300 seconds).
- Maximum size of a received PDU (default 16KB).
- If ImageVision should check Application Entity titles against its local database. If this checking AE titles is switched off, DICOM service class users that are not configured in the local database will also be able to use the DICOM services mentioned above.

The User Send and User Echo local activities use timeout and maximum PDU size parameters with defaults as defined above but are not configurable by a field service engineer.
6 Support of Extended Character Sets

The following extended character sets are supported:

ISO-IR 100  Latin Alphabet Supplementary Set No. 1 (ISO 8859-1)

Note: The DICOM default character set (ISO-IR 6) is a subset of ISO-IR 100.