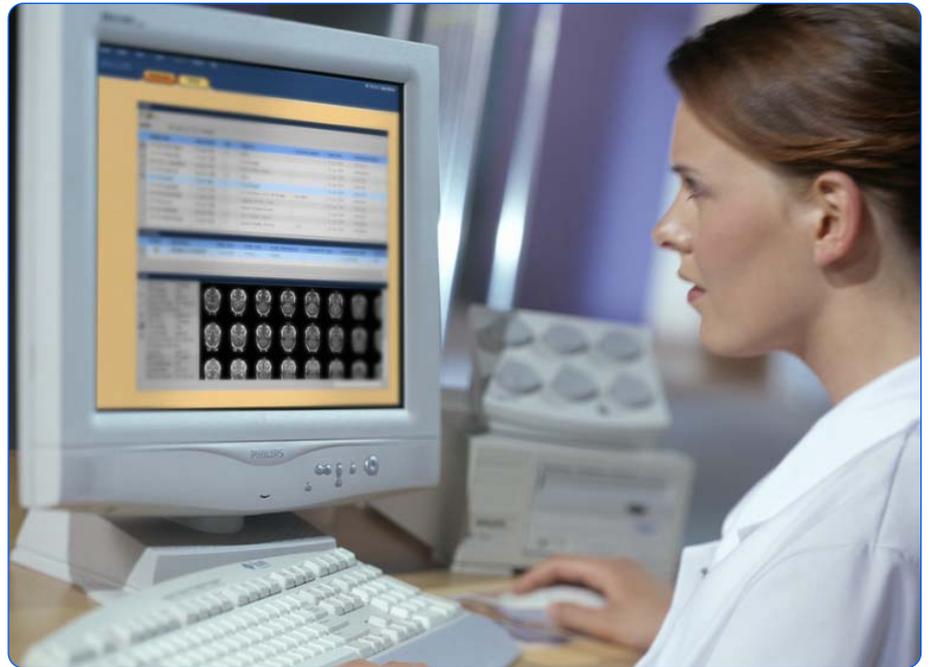


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# DICOM

## Conformance Statement

### ViewForum R4.1



***Issued by:***

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*DICOM Conformance Statement*

# 1 DICOM CONFORMANCE STATEMENT OVERVIEW

The ViewForum Release 4.1 system is a comprehensive range of hardware and software modules that allow for tailored clinical solutions. The software applications are categorized in packages, for instance the Volume package for CT/MR images. The hardware consists of a PC Windows workstation.

ViewForum R4.1 provides the following DICOM data exchange features:

- It receives images sent to it by remote systems (e.g. workstations or imaging modalities) and stores them in a database.
- It allows the operator to copy images from the database to remote databases and vice versa. For this purpose the operator is able to query remote databases.
- It allows a remote system to query the ViewForum R4.1 database and to retrieve images from it.
- It allows the operator to print images stored in the database on a DICOM printer.
- It is able to read and write DICOM CD-RW disks.
- It is able to read and write DICOM DVD-RW disks.

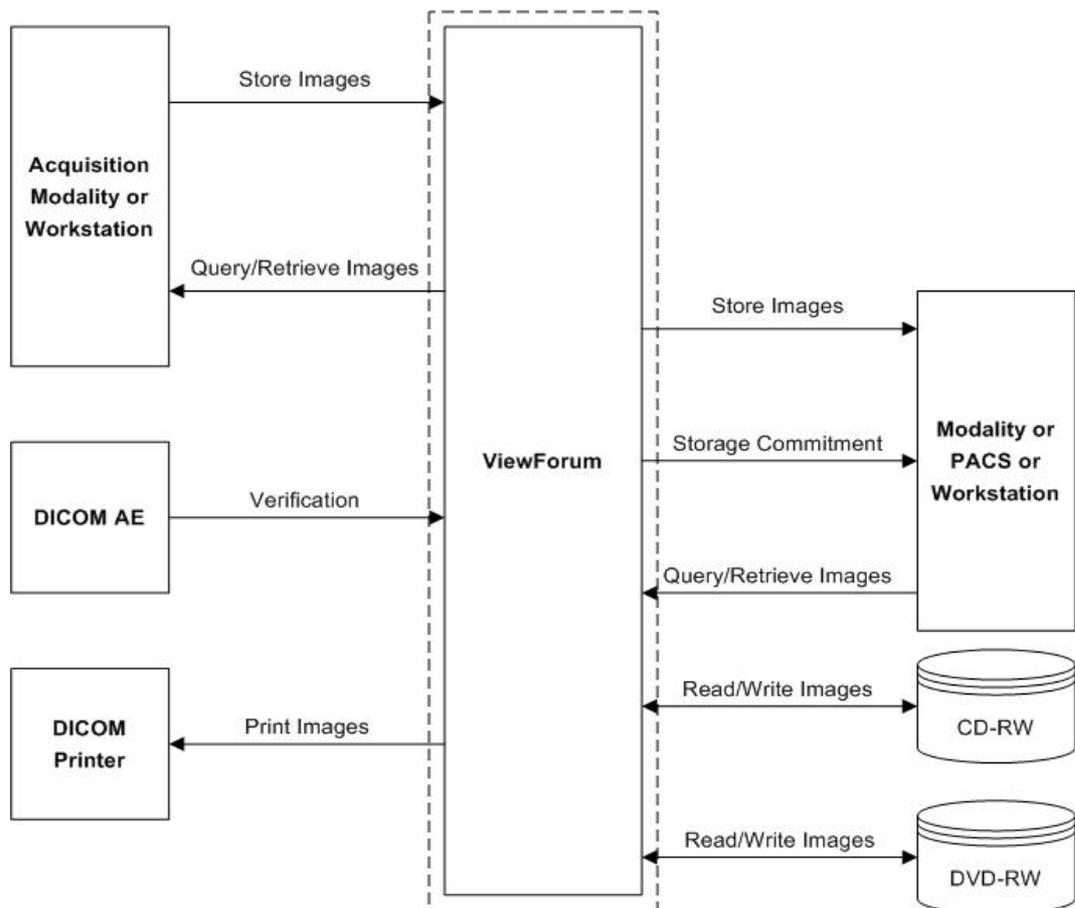


Figure 1: ViewForum R4.1 in a DICOM Network

ViewForum R4.1 allows the operator also to view, analyze and process the images stored in the database. Some advanced analysis and processing applications are primarily designed for images generated by Philips equipment when sent to the ViewForum R4.1.

This DICOM Conformance Statement describes the DICOM conformance of the ViewForum R4.1 platform. Application package specific DICOM conformance is described in separate Conformance Statements.

Table 1 presents an overview of all network services and the applicable SOP classes as provided by ViewForum R4.1.

**Table 1: Network Services**

| SOP Class  |                              | User of Service (SCU) | Provider of Service (SCP) |
|--|------------------------------|-----------------------|---------------------------|
| Name   | UID                          |                       |                           |
| <b>Storage</b>   |                              |                       |                           |
| Computed Radiography Image Storage                         | 1.2.840.10008.5.1.4.1.1.1    | Yes                   | Yes                       |
| Digital X-Ray Image Storage – for Presentation             | 1.2.840.10008.5.1.4.1.1.1.1  | Yes                   | Yes                       |
| CT Image Storage   | 1.2.840.10008.5.1.4.1.1.2    | Yes                   | Yes                       |
| Ultrasound Multi-frame Image Storage                       | 1.2.840.10008.5.1.4.1.1.3.1  | Yes                   | Yes                       |
| MR Image Storage   | 1.2.840.10008.5.1.4.1.1.4    | Yes                   | Yes                       |
| Ultrasound Image Storage                                   | 1.2.840.10008.5.1.4.1.1.6.1  | Yes                   | Yes                       |
| Secondary Capture Image Storage                            | 1.2.840.10008.5.1.4.1.1.7    | Yes                   | Yes                       |
| Grayscale Softcopy Presentation State Storage              | 1.2.840.10008.5.1.4.1.1.11.1 | Yes                   | Yes                       |
| X-Ray Angiographic Image Storage                           | 1.2.840.10008.5.1.4.1.1.12.1 | Yes                   | Yes                       |
| X-Ray Radiofluoroscopic Image Storage                      | 1.2.840.10008.5.1.4.1.1.12.2 | Yes                   | Yes                       |
| <b>Private Storage</b>                                     |                              |                       |                           |
| Specialized X-Ray  | 1.3.46.670589.2.3.1.1        | Yes                   | Yes                       |
| CX Image   | 1.3.46.670589.2.4.1.1        | Yes                   | Yes                       |
| 3D Volume Storage  | 1.3.46.670589.5.0.1.1        | Yes                   | Yes                       |
| 3D Volume Object Storage                                   | 1.3.46.670589.5.0.2.1        | Yes                   | Yes                       |
| Surface Storage  | 1.3.46.670589.5.0.3.1        | Yes                   | Yes                       |
| MR Cardio Storage  | 1.3.46.670589.5.0.8.1        | Yes                   | Yes                       |
| CT Synthetic Image   | 1.3.46.670589.5.0.9          | Yes                   | Yes                       |
| MR Synthetic Image   | 1.3.46.670589.5.0.10         | Yes                   | Yes                       |
| MR Cardio Analysis Storage                                 | 1.3.46.670589.5.0.11.1       | Yes                   | Yes                       |
| CX Synthetic Image   | 1.3.46.670589.5.0.12         | Yes                   | Yes                       |
| Perfusion  | 1.3.46.670589.5.0.13         | Yes                   | Yes                       |
| Perfusion Analysis   | 1.3.46.670589.5.0.14         | Yes                   | Yes                       |
| <b>Query/Retrieve</b>                                      |                              |                       |                           |
| Patient Root Query/Retrieve Information Model – FIND       | 1.2.840.10008.5.1.4.1.2.1.1  | Yes                   | Yes                       |
| Patient Root Query/Retrieve Information Model – MOVE       | 1.2.840.10008.5.1.4.1.2.1.2  | Yes                   | Yes                       |
| Study Root Query/Retrieve Information Model – FIND         | 1.2.840.10008.5.1.4.1.2.2.1  | Yes                   | Yes                       |
| Study Root Query/Retrieve Information Model – MOVE         | 1.2.840.10008.5.1.4.1.2.2.2  | Yes                   | Yes                       |
| Patient/Study Only Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.3.1  | Yes                   | Yes                       |
| Patient/Study Only Query/Retrieve Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.3.2  | Yes                   | Yes                       |

| SOP Class                               |                         | User of Service (SCU) | Provider of Service (SCP) |
|---|-------------------------|-----------------------|---------------------------|
| Name                                    | UID                     |                       |                           |
| <b>Workflow Management</b>              |                         |                       |                           |
| Storage Commitment Push Model           | 1.2.840.10008.1.20.1    | Yes                   | No                        |
| Verification                            | 1.2.840.10008.1.1       | No                    | Yes                       |
| <b>Print Management</b>                 |                         |                       |                           |
| Basic Grayscale Print Management (Meta) | 1.2.840.10008.5.1.1.9   | Yes                   | No                        |
| > Basic Film Session                    | 1.2.840.10008.5.1.1.1   | Yes                   | No                        |
| > Basic Film Box                        | 1.2.840.10008.5.1.1.2   | Yes                   | No                        |
| > Basic Grayscale Image Box             | 1.2.840.10008.5.1.1.4   | Yes                   | No                        |
| > Printer                               | 1.2.840.10008.5.1.1.16  | Yes                   | No                        |
| Basic Color Print Management (Meta)     | 1.2.840.10008.5.1.1.18  | Yes                   | No                        |
| > Basic Film Session                    | 1.2.840.10008.5.1.1.1   | Yes                   | No                        |
| > Basic Film Box                        | 1.2.840.10008.5.1.1.2   | Yes                   | No                        |
| > Basic Color Image Box                 | 1.2.840.10008.5.1.1.4.1 | Yes                   | No                        |
| > Printer                               | 1.2.840.10008.5.1.1.16  | Yes                   | No                        |
| Presentation LUT                        | 1.2.840.10008.5.1.1.23  | Yes                   | No                        |

The following table lists the Supported Media Storage Application Profiles (with roles).

**Table 2: Media Services**

| Media Storage Application Profile | Write Files (FSC / FSU) | Read Files (FSR) | Supported Media |
|-----------------------------------|-------------------------|------------------|-----------------|
| <b>CD – R Disk</b>                |                         |                  |                 |
| General Purpose CD-R              | YES / YES               | YES              | CD              |
| <b>DVD Disk</b>                   |                         |                  |                 |
| General Purpose DVD-JPEG          | YES / NO                | YES              | DVD+R / DVD+RW  |

*Note: Not supported are the Media DVD -R / -RW.*

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## 3 INTRODUCTION

### 3.1 Revision History

**Table 3: Revision History**

| Document Version | Date of Issue    | Author     | Description  |
|------------------|------------------|------------|--|
| 00               | 08-October-2004  | PMS MIT-IO | Preliminary version of the DICOM Conformance Statement for ViewForum Release 4.1 |
| 02               | 19-October-2004  | PMS MIT-IO | Update (after first draft), Commit Collect                                       |
| 04               | 10-December-2004 | PMS MIT-IO | Final version Conformance Statement ViewForum R4.1                               |

### 3.2 Audience

This DICOM Conformance Statement is intended for:

- (potential) customers
- system integrators of medical equipment
- marketing staff interested in system functionality
- software designers implementing DICOM interfaces

It is assumed that the reader is familiar with the DICOM standard.

### 3.3 Remarks

The DICOM Conformance Statement is contained in chapter 1 through 8 and follows the contents and structuring requirements of the DICOM Standard PS 3.2- XXXXX.

This DICOM Conformance Statement by itself does not guarantee successful interoperability of Philips equipment with non-Philips equipment. The user (or user's agent) should be aware of the following issues:

- **Interoperability**  
Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into an IT environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of Philips equipment with non-Philips equipment. It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates Philips equipment with non-Philips equipment.
- **Validation**  
Philips equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this DICOM Conformance Statement. Where Philips equipment is linked to non-Philips equipment, the first step is to compare the relevant DICOM Conformance Statements. If the DICOM Conformance Statements indicate that successful information exchange should be possible, additional validation tests will be necessary to ensure the

functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- **New versions of the DICOM Standard**

The DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Philips is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Philips reserves the right to make changes to its products or to discontinue its delivery.

The user should ensure that any non-Philips provider linking to Philips equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Philips equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

### 3.4 Definitions, Terms and Abbreviations

DICOM definitions, terms and abbreviations are used throughout this Conformance Statement. For a description of these, see NEMA PS 3.3-XXXX and PS 3.4-XXXX. The word Philips in this document refers to Philips Medical Systems. The following acronyms and abbreviations may be used in this document.

|          |   |
|----------|---|
| AE       | Application Entity                                  |
| CD       | Compact Disc  |
| CD-R     | CD-Recordable                                       |
| CT       | Computed Tomography                                 |
| DICOM    | Digital Imaging and Communications in Medicine      |
| DIMSE    | DICOM Message Service Element                       |
| DVD-JPEG | Digital Video Disc – JPEG                           |
| EBE      | DICOM Explicit VR Big Endian                        |
| ELE      | DICOM Explicit VR Little Endian                     |
| FSC      | File-set Creator                                    |
| FSR      | File-set Reader                                     |
| FSU      | File-set Updater                                    |
| GUI      | Graphical User Interface                            |
| HIPAA    | Health Insurance Portability and Accountability Act |
| ILE      | DICOM Implicit VR Little Endian                     |
| IHE      | Integrating the Healthcare Enterprise               |
| IOD      | Information Object Definition                       |
| JPEG     | Joint Photographic Experts Group                    |
| MR       | Magnetic Resonance                                  |
| N/A      | Not applicable                                      |
| NEMA     | National Electrical Manufacturers Association       |
| PDU      | Protocol Data Unit                                  |
| PMS(N)   | Philips Medical Systems (Nederland B.V.)            |
| Q/R      | Query/Retrieve (Service Class)                      |
| RWA      | Real-World Activity                                 |
| SC       | Secondary Capture                                   |
| SCP      | Service Class Provider                              |
| SCU      | Service Class User                                  |
| SOP      | Service Object Pair                                 |
| TCP/IP   | Transmission Control Protocol/Internet Protocol     |
| UID      | Unique Identifier                                   |

### 3.5 References

- [DICOM] Digital Imaging and Communications in Medicine (DICOM), Part 1 – 16 (NEMA PS 3.1 – PS 3.16),  
National Electrical Manufacturers Association (NEMA)  
Publication Sales 1300 N. 17<sup>th</sup> Street, Suite 1847  
Rosslyn, Virginia. 22209, United States of America
- [VFRB] Release Bulletin ViewForum 4.1, 4522 981 27301, PMSN.

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## 4 NETWORKING

This section contains the networking related services (vs. the media related ones).

### 4.1 Implementation model

The implementation model consists of three sections:

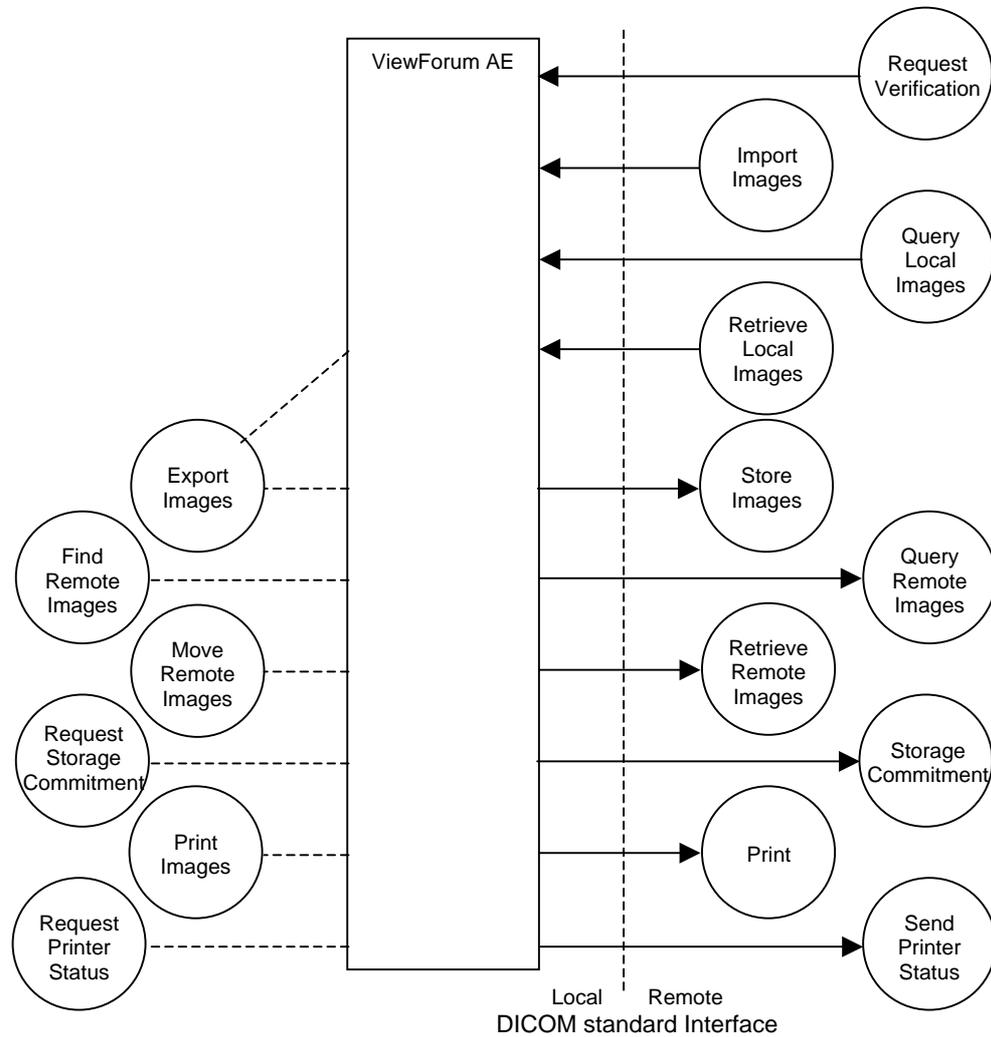
- The Application Data Flow Diagram, specifying the relationship between the ViewForum R4.1 Application Entity and the “external world” or Real-World activities,
- A functional description of the ViewForum R4.1 Application Entity, and
- the sequencing constraints among them.

#### 4.1.1 Application Data Flow

The ViewForum R4.1 system consists of one single application entity only: the ViewForum Application Entity (ViewForum AE).

Figure 2 shows the Networking application data flow as a functional overview of the ViewForum AE. As depicted in Figure 2, the ViewForum AE incorporates the following functionality.

- After RWA Request Verification, the ViewForum AE as SCP provides standard Verification Service Class functionality to the requesting SCU.
- After RWA Import Images, the ViewForum AE as SCP provides standard Storage Service Class functionality to the requesting SCU.
- After RWA Query Local Images/Retrieve Local Images, the ViewForum AE as SCP provides standard Query/Retrieve Service Class functionality to the requesting SCU.
- After RWA Export Images (triggered by either the operator or RWA Retrieve Local Images), the ViewForum AE as SCU uses the remote SCP Storage Service Class functionality to store local images on a remote database.
- After operator RWA Find Remote Images, the ViewForum AE as SCU uses the remote SCP Query/Retrieve Service Class functionality to query remote images.
- After operator RWA Move Remote Images, the ViewForum AE as SCU uses the remote SCP Query/Retrieve Service Class functionality to retrieve remote images.
- After operator RWA Request Storage Commitment, the ViewForum AE as SCU uses the remote SCP Storage Commitment Service Class functionality to commit remote images.
- After operator RWA Print Images, the ViewForum AE as SCU uses the remote Print Management Service Class to print local images.
- After operator RWA Request Printer Status, the ViewForum AE as SCU uses the remote Print Management Service Class to request the printer status.



**Figure 2: Networking Application Data Flow Diagram**

**4.1.2 Functional Definition of AE's**

This section shall describe in general terms the functions to be performed by the AE, and the DICOM services used to accomplish these functions.

**4.1.2.1 Functional Definition of ViewForum AE**

The ViewForum AE is the one and only application entity within ViewForum R4.1. It includes the following service classes.

**Verification Service Class**

The ViewForum AE can perform the Verification service as SCP (RWA Request Verification).

---

A remote SCU shall request an association with the ViewForum AE for Verification SOP class. After accepting the association, the ViewForum AE shall receive and respond to the Verification request, and release the association when requested.

#### **Storage Service Class**

The ViewForum AE can perform the Storage service as SCP (RWA Import Images).

A remote SCU shall request an association with the ViewForum AE for Storage SOP classes. After accepting the association, the ViewForum AE shall receive the Storage requests, store the data in the local database, send the applicable Storage responses, and release the association when requested.

The ViewForum AE can perform the Storage service as SCU (RWA Export Images, triggered by operator or retrieve request).

The ViewForum AE shall request an association with the selected remote SCP for all applicable Storage SOP classes. When the association is accepted, the ViewForum AE shall send the Storage requests (including data from local database), receive the Storage responses and act accordingly, and release the association. Finally, if configured, the ViewForum AE shall request storage commitment per Storage Commitment service (ref. Storage Commitment service class).

#### **Query/Retrieve Service Class**

The ViewForum AE can perform the Query/Retrieve service as SCP (RWA Query Local Images and RWA Retrieve Local Images).

A remote SCU shall request an association with the ViewForum AE for Query/Retrieve SOP classes. After accepting the association, the ViewForum AE shall receive the Query/Retrieve requests. In case of a Retrieve request, the ViewForum AE shall request storage per Storage service as SCU (ref. Storage Service Class). Next, the ViewForum AE shall send the applicable Query/Retrieve responses, and release the association when requested.

The ViewForum AE can perform the Query/Retrieve service as SCU (RWA Find Remote Images and RWA Move Remote Images).

The ViewForum AE shall request an association with the selected remote SCP for the applicable (configured) Query/Retrieve SOP class. When the association is accepted, the ViewForum AE shall send the Query/Retrieve requests, receive the Query/Retrieve responses and act accordingly, and finally release the association.

The ViewForum AE fully supports the Cancel functionality, both as SCU and as SCP.

#### **Storage Commitment Service Class**

The ViewForum AE can perform the Storage Commitment service as SCU (RWA Request Storage Commitment).

The ViewForum AE shall request an association with the selected remote SCP for the Storage Commitment Push Model SOP class. When the association is accepted, the ViewForum AE shall send the Storage Commitment requests, receive the Storage Commitment responses and act accordingly, and release the association.

When the remote commitment actions have been finished, the remote SCP should request an association with the ViewForum AE (still SCU). After accepting the association, the ViewForum AE shall receive the Storage Commitment reports, and release the association when requested.

The Storage Commitment Service can be done Synchronous and Asynchronous. A detailed specification of the Storage Commitment is described in section 4.2.1.3.4 (RWA Request Storage Commitment).

#### **Print Management Service Class**

The ViewForum AE can perform the Print service as SCU (RWA Print Images).

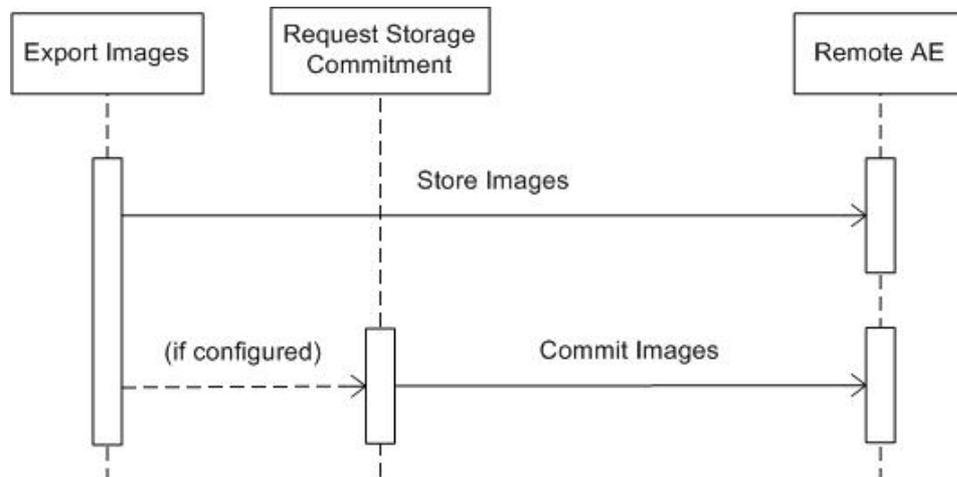
The ViewForum AE shall request an association with the selected remote SCP (printer) for all applicable SOP classes of the applicable Print Management Meta SOP class. When the association is accepted, the ViewForum AE shall send the Print requests (including data from local database), receive the Print responses and act accordingly, and finally release the association.

The ViewForum AE can perform the Printer service as SCU (RWA Request Printer Status)

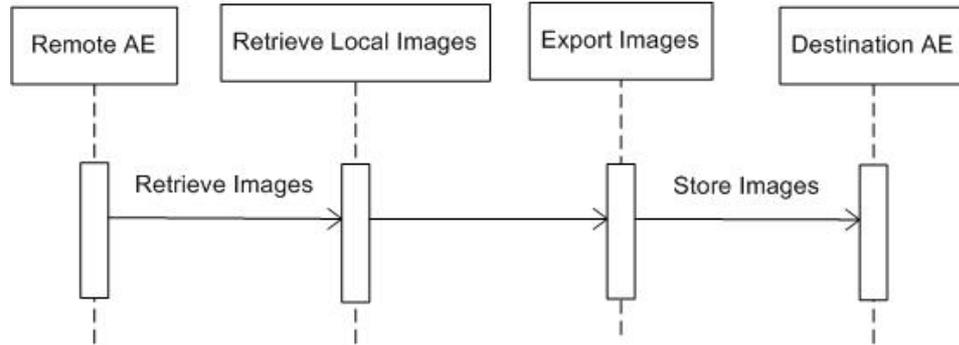
The ViewForum AE shall request an association with the selected remote SCP (printer) for the Printer SOP class. When the association is accepted, the ViewForum AE shall send the Get/Event Report request, receive the Printer responses and act accordingly, and finally release the association.

### **4.1.3 Sequencing of Real World Activities**

This section shall contain a description of specific sequencing as well as potential constraints of Real-World Activities, including any applicable user interactions, as performed by the ViewForum AE.



**Figure 3: RWA Sequencing for Export Images**



**Figure 4: RWA Sequencing for Retrieve Local Images**

## 4.2 AE Specifications

The next section in the DICOM Conformance Statement contains the specification of the one and only ViewForum R4.1 Application Entity: ViewForum AE.

### 4.2.1 ViewForum AE

Every detail of this specific Application Entity shall be completely specified under this section.

#### 4.2.1.1 SOP Classes

This Application Entity provides extended Standard Conformance to the following SOP classes.

**Table 4: SOP Classes for ViewForum AE**

| SOP Class Name                                 | SOP Class UID               | SCU | SCP |
|--|-----------------------------|-----|-----|
| Storage Commitment Push Model                  | 1.2.840.10008.1.20.1        | Yes | No  |
| Basic Grayscale Print Management (Meta)        | 1.2.840.10008.5.1.1.9       | Yes | No  |
| > Basic Film Session                           | 1.2.840.10008.5.1.1.1       | Yes | No  |
| > Basic Film Box                               | 1.2.840.10008.5.1.1.2       | Yes | No  |
| > Basic Grayscale Image Box                    | 1.2.840.10008.5.1.1.4       | Yes | No  |
| > Printer                                      | 1.2.840.10008.5.1.1.16      | Yes | No  |
| Basic Color Print Management (Meta)            | 1.2.840.10008.5.1.1.18      | Yes | No  |
| > Basic Film Session                           | 1.2.840.10008.5.1.1.1       | Yes | No  |
| > Basic Film Box                               | 1.2.840.10008.5.1.1.2       | Yes | No  |
| > Basic Color Image Box                        | 1.2.840.10008.5.1.1.4.1     | Yes | No  |
| > Printer                                      | 1.2.840.10008.5.1.1.16      | Yes | No  |
| Presentation LUT                               | 1.2.840.10008.5.1.1.23      | Yes | No  |
| Computed Radiography Image Storage             | 1.2.840.10008.5.1.4.1.1.1   | Yes | Yes |
| Digital X-Ray Image Storage – for Presentation | 1.2.840.10008.5.1.4.1.1.1.1 | Yes | Yes |
| CT Image Storage                               | 1.2.840.10008.5.1.4.1.1.2   | Yes | Yes |
| Ultrasound Multi-frame Image Storage           | 1.2.840.10008.5.1.4.1.1.3.1 | Yes | Yes |
| MR Image Storage                               | 1.2.840.10008.5.1.4.1.1.4   | Yes | Yes |
| Ultrasound Image Storage                       | 1.2.840.10008.5.1.4.1.1.6.1 | Yes | Yes |
| Secondary Capture Image Storage                | 1.2.840.10008.5.1.4.1.1.7   | Yes | Yes |

| SOP Class Name   | SOP Class UID                | SCU | SCP |
|--|------------------------------|-----|-----|
| Grayscale Softcopy Presentation State Storage              | 1.2.840.10008.5.1.4.1.1.11.1 | Yes | Yes |
| X-Ray Angiographic Image Storage                           | 1.2.840.10008.5.1.4.1.1.12.1 | Yes | Yes |
| X-Ray Radiofluoroscopic Image Storage                      | 1.2.840.10008.5.1.4.1.1.12.2 | Yes | Yes |
| Patient Root Query/Retrieve Information Model – FIND       | 1.2.840.10008.5.1.4.1.2.1.1  | Yes | Yes |
| Patient Root Query/Retrieve Information Model – MOVE       | 1.2.840.10008.5.1.4.1.2.1.2  | Yes | Yes |
| Study Root Query/Retrieve Information Model – FIND         | 1.2.840.10008.5.1.4.1.2.2.1  | Yes | Yes |
| Study Root Query/Retrieve Information Model – MOVE         | 1.2.840.10008.5.1.4.1.2.2.2  | Yes | Yes |
| Patient/Study Only Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.3.1  | Yes | Yes |
| Patient/Study Only Query/Retrieve Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.3.2  | Yes | Yes |
| Specialized X-Ray  | 1.3.46.670589.2.3.1.1        | Yes | Yes |
| CX Image   | 1.3.46.670589.2.4.1.1        | Yes | Yes |
| 3D Volume Storage  | 1.3.46.670589.5.0.1.1        | Yes | Yes |
| 3D Volume Object Storage                                   | 1.3.46.670589.5.0.2.1        | Yes | Yes |
| Surface Storage  | 1.3.46.670589.5.0.3.1        | Yes | Yes |
| MR Cardio Storage  | 1.3.46.670589.5.0.8.1        | Yes | Yes |
| CT Synthetic Image   | 1.3.46.670589.5.0.9          | Yes | Yes |
| MR Synthetic Image   | 1.3.46.670589.5.0.10         | Yes | Yes |
| MR Cardio Analysis Storage                                 | 1.3.46.670589.5.0.11.1       | Yes | Yes |
| CX Synthetic Image   | 1.3.46.670589.5.0.12         | Yes | Yes |
| Perfusion  | 1.3.46.670589.5.0.13         | Yes | Yes |
| Perfusion Analysis   | 1.3.46.670589.5.0.14         | Yes | Yes |

Note: Any SOP specific behavior is documented later in the Conformance Statement in the applicable SOP specific conformance section.

#### Remarks:

- During installation the list of available SOP classes can be configured per ViewForum R4.1 system. The SOP classes to be supported can be configured per remote station.
- The Private SOP classes may be stored in image archives, but are to be used by ViewForum R4.1 systems only!
- In case the remote SCP system does not support the import of a specific image storage SOP class, the ViewForum AE will convert and send such images as Secondary Capture images (if configured to do so).
- After storing images as SCU the ViewForum AE shall request Storage Commitment (only as configured).

#### 4.2.1.2 Association Policies

This section shall contain a description of the General Association Establishment and Acceptance policies of the AE.

##### 4.2.1.2.1 General

The DICOM standard application context shall be specified.

**Table 5: DICOM Application Context**

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

#### 4.2.1.2.2 Number of Associations

The number of simultaneous associations, which an Application Entity may support as a SCU or SCP, shall be specified. Any rules governing simultaneity of associations shall be defined here.

**Table 6: Number of Associations as an Association Initiator for ViewForum AE**

|   |     |
|---|-----|
| Maximum number of simultaneous associations | 3 * |
|---|-----|

\* As a result of local activities, ViewForum R4.1 will initiate at most 3 simultaneous associations. One association may be used to issue **query** requests, the other association may be used to issue **store or retrieve** requests, and another association may be used for **print** requests.

Furthermore, ViewForum R4.1 may initiate an association for each remote retrieve request, executed by ViewForum R4.1 as a C-MOVE operation. These associations are used to issue the C-STORE sub-operations implied by the retrieve requests. The number of simultaneous store associations for this retrieve purpose is principally not limited.

The number of simultaneous associations for Storage Commitment is configurable.

**Table 7: Number of Associations as an Association Acceptor for ViewForum AE**

|   |              |
|---|--------------|
| Maximum number of simultaneous associations | Configurable |
|---|--------------|

Nevertheless, the number of simultaneous associations shall be limited by the available resources (CPU, memory, disk space).

#### 4.2.1.2.3 Asynchronous Nature

ViewForum R4.1 does not support asynchronous operations, and will not perform asynchronous window negotiation.

**Table 8: Asynchronous Nature as an Association Initiator for ViewForum AE**

|   |     |
|---|-----|
| Maximum number of outstanding asynchronous transactions | N/A |
|---|-----|

#### 4.2.1.2.4 Implementation Identifying Information

Following Implementation Class UID and Version Name are defined.

**Table 9: DICOM Implementation Class and Version for ViewForum AE**

|                             |                      |
|-----------------------------|----------------------|
| Implementation Class UID    | 1.3.46.670589.5.2.23 |
| Implementation Version Name | ViewForum R4.1       |

### 4.2.1.3 Association Initiation Policy

ViewForum R4.1 shall initiate associations as a result of the following events.

- The operator or a remote (Query/Retrieve) application copies selected images from the ViewForum R4.1 database to another database; ref. section 4.2.1.3.1 Export Images.
- The operator queries a remote database; ref. section 4.2.1.3.2 Find Remote Images.
- The operator copies selected images from a remote database to another database; ref. section 4.2.1.3.3 Move Remote Images.
- The operator requests storage commitment of images on a remote database; ref. section 4.2.1.3.4 Request Storage Commitment.
- The operator requests to print selected images of the ViewForum R4.1 database; ref. section 4.2.1.3.5 Print Images.
- The operator requests the status of the selected printer; ref. section 4.2.1.3.6 Request Printer Status.

#### 4.2.1.3.1 Export Images

##### 4.2.1.3.1.1 Description and Sequencing of Activities

The RWA Export Images involves the storage of images from the local ViewForum R4.1 database to a remote system.

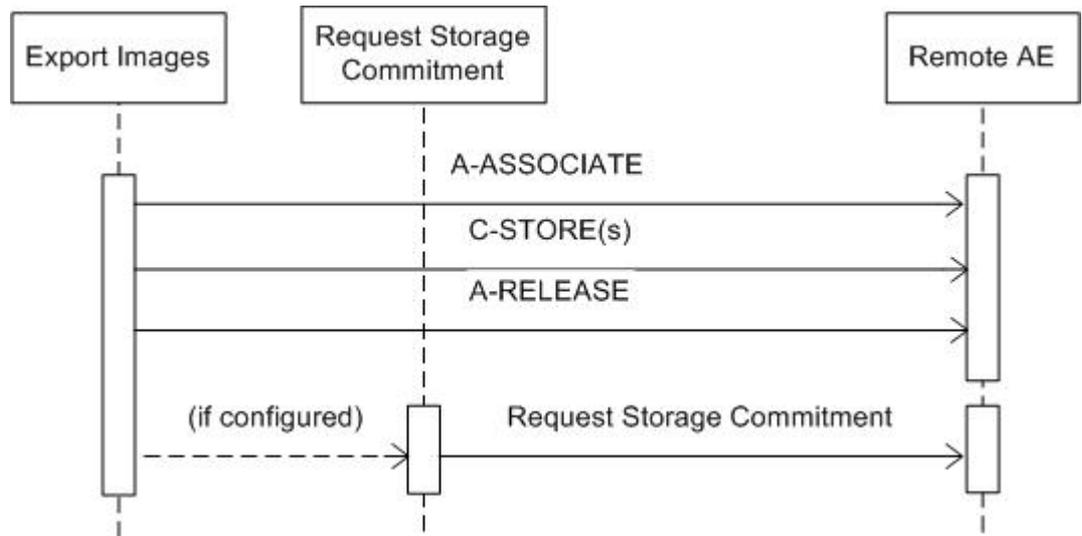
There are two ways for the ViewForum AE to initiate Export Images.

1. The operator is able to copy the images selected in a patient folder from the local ViewForum R4.1 database to another database by means of the copy tool in the ViewForum R4.1 data-handling tool. For each selected patient ViewForum R4.1 initiates an association to the selected peer entity, and uses it to send C-STORE requests and receive the associated C-STORE responses. The association is released when all selected images in the selected folder have been transmitted.  
ViewForum R4.1 handles operator copy requests one after another.
2. A remote application copies images from the local ViewForum R4.1 database to another database by sending a C-MOVE request to ViewForum R4.1. For each received retrieve request ViewForum R4.1 initiates an association to the requested retrieve/move destination, and uses it to send C-STORE requests and receive associated C-STORE responses. The association is released when all instances, i.e. images and presentation states as selected by the retrieve request identifier, have been stored.  
ViewForum R4.1 is able to simultaneously handle C-MOVE requests.

Along with the image data the ViewForum AE shall also export presentation state data. If the SCP supports the Grayscale Softcopy Presentation State storage SOP class then the applicable presentation state data will be transferred as such, otherwise the presentation state data will be merged with the image data before export. Please refer to section 8.1.3, Coerced/Modified fields, for more information on presentation state storage.

If configured, the ViewForum AE shall also try and initiate a storage commitment of the stored image (after releasing the storage association). See section 4.2.1.3.4 (RWA Request Storage Commitment) for a detailed specification of the storage commitment.

Figure 5 shows the sequence of events after the operator or remote application initiates the RWA Export Images.



**Figure 5: Sequencing of RWA Export Images**

**4.2.1.3.1.2 Proposed Presentation Contexts**

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. The Presentation Contexts proposed by the ViewForum AE for Export Images are defined in Table 10.

Table 10: Proposed Presentation Contexts for Export Images

| Presentation Context Table                     |                              |                   |   |      |                      |
|--|------------------------------|-------------------|---|------|----------------------|
| Abstract Syntax                                |                              | Transfer Syntax   |   | Role | Extended Negotiation |
| Name   | UID                          | Name List (note)  | UID List  |      |                      |
| Computed Radiography Image Storage             | 1.2.840.10008.5.1.4.1.1.1    | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Digital X-Ray Image Storage – for Presentation | 1.2.840.10008.5.1.4.1.1.1.1  | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| CT Image Storage                               | 1.2.840.10008.5.1.4.1.1.2    | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| MR Image Storage                               | 1.2.840.10008.5.1.4.1.1.4    | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Secondary Capture Image Storage                | 1.2.840.10008.5.1.4.1.1.7    | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Grayscale Softcopy Presentation State Storage  | 1.2.840.10008.5.1.4.1.1.11.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| X-Ray Angiographic Image Storage               | 1.2.840.10008.5.1.4.1.1.12.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| X-Ray Radiofluoroscopic Image Storage          | 1.2.840.10008.5.1.4.1.1.12.2 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Specialized X-Ray                              | 1.3.46.670589.2.3.1.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| CX Image                                       | 1.3.46.670589.2.4.1.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| 3D Volume Storage                              | 1.3.46.670589.5.0.1.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| 3D Volume Object Storage                       | 1.3.46.670589.5.0.2.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Surface Storage                                | 1.3.46.670589.5.0.3.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| MR cardio Storage                              | 1.3.46.670589.5.0.8.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| CT Synthetic Image                             | 1.3.46.670589.5.0.9          | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| MR Synthetic Image                             | 1.3.46.670589.5.0.10         | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| MR Cardio Analysis Storage                     | 1.3.46.670589.5.0.11.1       | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| CX Synthetic Image                             | 1.3.46.670589.5.0.12         | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

| Presentation Context Table            |                             |   |   |      |                      |
|---------------------------------------|-----------------------------|---|---|------|----------------------|
| Abstract Syntax                       |                             | Transfer Syntax                             |   | Role | Extended Negotiation |
| Name                                  | UID                         | Name List (note)                            | UID List  |      |                      |
| Perfusion                             | 1.3.46.670589.5.0.13        | ILE<br>ELE<br>EBE                           | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2                           | SCU  | None                 |
| Perfusion Analysis                    | 1.3.46.670589.5.0.14        | ILE<br>ELE<br>EBE                           | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2                           | SCU  | None                 |
| Ultra sound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | ILE<br>ELE<br>EBE<br>JPEG Baseline (Note 1) | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2<br>1.2.840.10008.1.2.4.50 | SCU  | None                 |
| Ultra sound Image Storage             | 1.2.840.10008.5.1.4.1.1.6.1 | ILE<br>ELE<br>EBE<br>JPEG Baseline (Note 1) | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2<br>1.2.840.10008.1.2.4.50 | SCU  | None                 |

Note : For performance reasons the ELE transfer syntax is preferred

Note1: Only for Photometric Interpretation of RGB and YBR\_FULL\_422. Therefore JPEG Baseline transfer syntax may NOT be configured for SCU systems that are capable of handling storage of monochrome images too.

#### 4.2.1.3.1.3 SOP Specific Conformance for SOP Classes

Important remarks about the exported images:

- In case the remote system does not support modality specific image storage SOP class, the ViewForum AE will convert the images (if configured to do so) and send them via the Secondary Capture image storage SOP class. These Secondary Capture images and additional information (like graphics, text and important attribute information) are burnt-in (if configured). The original bit depth of the Secondary Capture image is kept. Note: only standard DICOM images can be converted, private SOP classes cannot be converted.
- In case of color images, all color-coding schemes are sent as they were received.
- Attributes e.g. Study Date and Study Time will be added to images to be exported (if not yet present). This is done because there are imaging systems relying on the existence of these attributes.
- On the export of an imported image the ViewForum adds private attributes to the image.
- The exported ViewForum R4.1 images do not contain Instance Number if the original images received from modalities do not contain this attribute or provide information in other attributes for ViewForum R4.1 to generate it.
- Exported CT/MR images relate Scanogram and Slice images in the following way: Attribute 'Referenced Image Sequence' is present in the slice images and points to the related Scanogram image. Note that Attribute 'Frame of Reference UID' in the Scanogram (Localiser image) and related image slices are not guaranteed to be equal; this depends on the source of the images.
- For Secondary Capture images only one Window Width and Window Centre value is exported.
- Please refer to section 8.1.3, Coerced/Modified fields, for more information on stored images.

### Use of optional, private and retired attributes

The transmitted Storage SOP instances may include all optional elements specified in the DICOM standard, depending on the source of the images.

The transmitted Storage SOP instances may contain Retired and Private data elements, depending on the source of the images and of the ViewForum R4.1 configuration.

When exporting images the ViewForum AE can convert the transfer syntax according to the following table.

**Table 11: Transfer Syntax Conversion**

| Syntax        | Source | ILE | ELE | EBE | JPEG Baseline |
|---------------|--------|-----|-----|-----|---------------|
| Destination   | /      |     |     |     |               |
| ILE           |        | +   | +   | +   | -             |
| ELE           |        | +   | +   | +   | -             |
| EBE           |        | +   | +   | +   | -             |
| JPEG Baseline | *      | +   | +   | +   | -             |

- *JPEG Baseline is only supported for images with Photometric Interpretation of YBR\_FULL\_422.*
- *As ViewForum R4.1 internally stores the images in uncompressed format, the image data shall be compressed to JPEG (RGB to YBR\_FULL\_422) before export.*
- *Note that JPEG Baseline transfer syntax may NOT be configured for SCU systems that are capable of handling storage of monochrome images too.*

The store response status is saved in the log file; a user error will be displayed in the GUI.

The ViewForum AE will stop the transfer of the images and release the association as soon as it receives an unsuccessful store response status. In case that a remote application requested the transfer (by means of a C-MOVE request), a move response with status unsuccessful is sent to the retrieve requestor.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

**Table 12: DICOM Command Response Status Handling Behavior**

| Service Status | Further Meaning                   | Error Code | Behavior   |
|----------------|-----------------------------------|------------|--|
| Success        | Storage is complete               | 0000       | Continues with next store until completed thereafter the store job is marked as completed and the association is released. |
| Refused        | Out of Resources                  | A7xx       | The store job fails and the association is released.<br>The reason is logged and reported to the user.                     |
| Error          | Data set does not match SOP Class | A9xx       | The store job fails and the association is released.<br>The reason is logged and reported to the user.                     |
|                | Cannot understand                 | Cxxx       | The store job fails and the association is released.<br>The reason is logged and reported to the user.                     |
| Warning        | Coercion of Data Elements         | B000       | Continues with next store until completed thereafter the store job is marked as completed and the association is released. |
|                | Elements discarded                | B006       | Continues with next store until completed thereafter the store job is marked as completed and the association is released. |
|                | Data set does not match SOP class | B007       | Continues with next store until completed thereafter the store job is marked as completed and the association is released. |

**Table 13: DICOM Command Communication Failure Behavior**

| Exception                | Behavior  |
|--------------------------|---|
| ARTIM Time-out           | The store job fails in case of association setup.<br>The reason is logged and reported to the user.   |
| Reply Time-out           | The store job fails and the association is aborted.<br>The reason is logged and reported to the user. |
| Association Time-out SCU | The association is released.  |
| Association aborted      | The store job fails.<br>The reason is logged and reported to the user.                                |

### 4.2.1.3.2 Find Remote Images

#### 4.2.1.3.2.1 Description and Sequencing of Activities

The RWA Find Remote Images involves the query of a remote system to find matching images in the remote database.

The operator queries a remote database by means of the query tool in the ViewForum R4.1 data handling facility. The ViewForum AE initiates an association to the selected peer entity and uses it to send Query (C-FIND) requests (and receive the associated responses). The association is released when the execution of the query completes (the Q/R dialog on the GUI is closed).

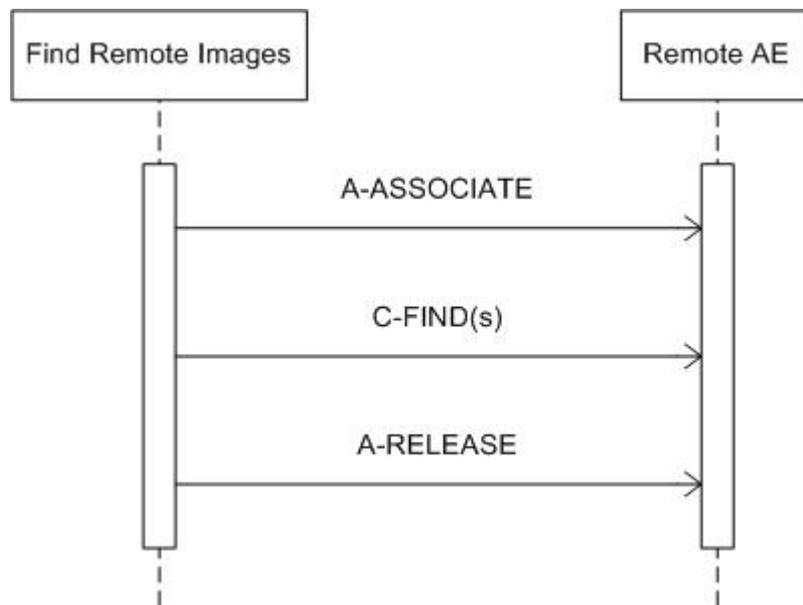


Figure 6: Sequencing of RWA Find Remote Images

#### 4.2.1.3.2.2 Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. In this subsection, the Presentation Contexts proposed by the ViewForum AE for Find Remote Images are defined in Table 14.

**Table 14: Proposed Presentation Contexts for Find Remote Images**

| Presentation Context Table                                 |                             |                   |   |      |                      |
|--|-----------------------------|-------------------|---|------|----------------------|
| Abstract Syntax  |                             | Transfer Syntax   |   | Role | Extended Negotiation |
| Name   | UID                         | Name List (note)  | UID List  |      |                      |
| Patient Root Query /Retrieve Information Model - FIND      | 1.2.840.10008.5.1.4.1.2.1.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Study Root Query /Retrieve Information Model - FIND        | 1.2.840.10008.5.1.4.1.2.2.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Patient/Study Only Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.3.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

Note: For performance reasons the ELE transfer syntax is preferred.

#### 4.2.1.3.2.3 SOP Specific Conformance for SOP Classes

The ViewForum AE will not generate queries containing optional keys. The ViewForum AE will not generate relational queries.

In the following table the supported query keys for each query level are described. Universal matching shall be supported as default.

**Table 15: Supported Query Keys**

| Query Level | Query Key                   |           | Type of Matching     |
|-------------|-----------------------------|-----------|----------------------|
|             | Name                        | Tag       |                      |
| Patient     | Patient's Name              | 0010,0010 | Wild Card/ Universal |
|             | Patient ID                  | 0010,0020 | Wild Card/ Universal |
|             | Patient's Birth Date        | 0010,0030 | -                    |
|             | Patient's Sex               | 0010,0040 | -                    |
| Study       | Study Date                  | 0008,0020 | -                    |
|             | Study Time                  | 0008,0030 | -                    |
|             | Accession Number            | 0008,0050 | -                    |
|             | Modalities in Study         | 0008,0061 | -                    |
|             | Referring Physician's Name  | 0008,0090 | -                    |
|             | Study Description           | 0008,1030 | -                    |
|             | Study Instance UID          | 0020,000D | -                    |
|             | Study ID                    | 0020,0010 | -                    |
| Series      | Modality                    | 0008,0060 | -                    |
|             | Station Name                | 0008,1010 | -                    |
|             | Performing Physician's Name | 0008,1050 | -                    |
|             | Body Part Examined          | 0018,0015 | -                    |
|             | Protocol Name               | 0018,1030 | -                    |

| Query Level | Query Key                           |           | Type of Matching |
|-------------|-------------------------------------|-----------|------------------|
|             | Name                                | Tag       |                  |
| Image       | Series Instance UID                 | 0020,000E | -                |
|             | Series Number                       | 0020,0011 | -                |
|             | Performed Procedure Step Start Date | 0040,0244 | -                |
|             | Performed Procedure Step ID         | 0040,0253 | -                |
|             | SOP Class UID                       | 0008,0016 | -                |
|             | SOP Instance UID                    | 0008,0018 | -                |
|             | Content Date                        | 0008,0023 | -                |
|             | Content Time                        | 0008,0033 | -                |
|             | Instance Number                     | 0020,0013 | -                |

Do note that the query results screen will display all patients that have an empty Patient ID as one patient entry.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

**Table 16: DICOM Command Response Status Handling Behavior**

| Service Status | Further Meaning  | Error Code | Behavior   |
|----------------|--|------------|--|
| Success        | Matching is complete   | 0000       | The find results are displayed.                      |
| Refused        | Out of Resources   | A700       | No find results are displayed. The reason is logged. |
| Failed         | Identifier does not match SOP class  | A900       | No find results are displayed. The reason is logged. |
|                | Unable to process  | Cxxx       | No find results are displayed. The reason is logged. |
| Cancel         | Matching terminated due to Cancel Request  | FE00       | No find results are displayed. The reason is logged. |
| Pending        | Matches are continuing – Current match is supplied and any optional keys were supported in the same manner as required keys          | FF00       | The find command continues.                          |
|                | Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier | FF01       | The find command continues.                          |

**Table 17: DICOM Command Communication Failure Behavior**

| Exception                | Behavior   |
|--------------------------|--|
| ARTIM Time-out           | N/A  |
| Reply Time-out           | The query fails and the association is aborted. The reason is logged and reported to the user. |
| Association Time-out SCU | The association is released.   |
| Association aborted      | The query fails. The reason is logged and reported to the user.                                |

### 4.2.1.3.3 Move Remote Images

#### 4.2.1.3.3.1 Description and Sequencing of Activities

The RWA Move Remote Images involves the retrieve of images on a remote system by moving matching images from the remote database to another database.

The operator is able to copy the selected images in a patient folder from a remote database to another, local or remote, database by means of the copy tool in the ViewForum R4.1 data handling facility. The ViewForum AE initiates for each copy request an association to the selected peer entity (Remote AE) and uses it to send the Retrieve (C-MOVE) request (and receive the associated responses). An examination may contain both images and presentation states. The association is released after the final Retrieve (C-MOVE) response for the related request has been received (no more pending).

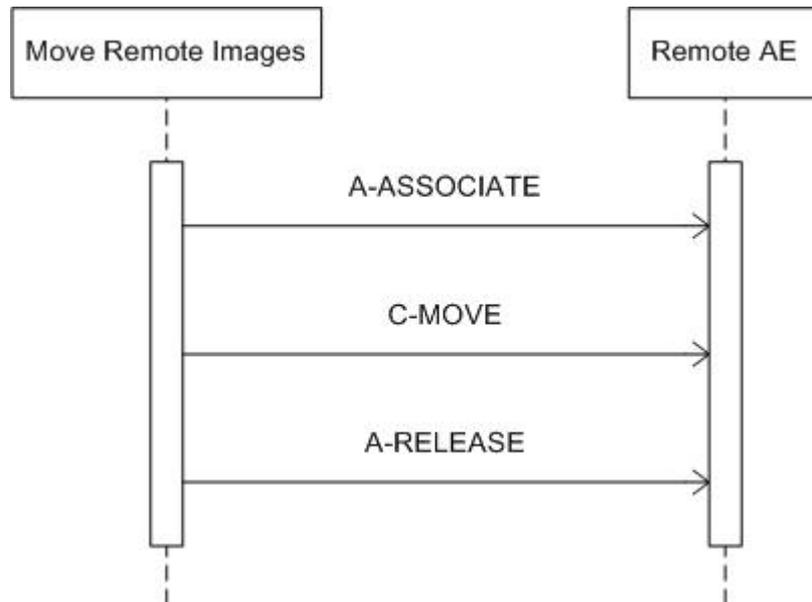


Figure 7: Sequencing of RWA Move Remote Images

#### 4.2.1.3.3.2 Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. In this subsection, the Presentation Contexts proposed by the ViewForum AE for Move Remote Images are defined in Table 18.

**Table 18: Proposed Presentation Contexts for Move Remote Images**

| Presentation Context Table                                 |                             |                   |   |      |                      |
|--|-----------------------------|-------------------|---|------|----------------------|
| Abstract Syntax  |                             | Transfer Syntax   |   | Role | Extended Negotiation |
| Name   | UID                         | Name List (note)  | UID List  |      |                      |
| Patient Root Query /Retrieve Information Model - MOVE      | 1.2.840.10008.5.1.4.1.2.1.2 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Study Root Query /Retrieve Information Model - MOVE        | 1.2.840.10008.5.1.4.1.2.2.2 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Patient/Study Only Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.3.2 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

Note: For performance reasons the ELE transfer syntax is preferred.

#### 4.2.1.3.3.3 SOP Specific Conformance for SOP Classes

The ViewForum AE provides standard conformance.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

**Table 19: DICOM Command Response Status Handling Behavior**

| Service Status | Further Meaning  | Error Code | Behavior  |
|----------------|--|------------|---|
| Success        | Sub-operations complete – No Failures                    | 0000       | The move job is marked as completed.<br>The association is released.  |
| Refused        | Out of Resources – Unable to calculate number of matches | A701       | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
|                | Out of Resources – Unable to perform Sub-operations      | A702       | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
|                | Move Destination unknown                                 | A801       | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
| Failed         | Identifier does not match SOP class                      | A900       | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
|                | Unable to process  | Cxxx       | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
| Cancel         | Sub-operations terminated due to Cancel Indication       | FE00       | The move job is marked as failed.<br>The association is released.<br>The reason is logged and reported to the user. |
| Warning        | Sub-operations complete – One or more Failures           | B000       | The move job is marked as completed.<br>The association is released.  |
| Pending        | Sub-operations are continuing                            | FF00       | The move job continues.   |

**Table 20: DICOM Command Communication Failure Behavior**

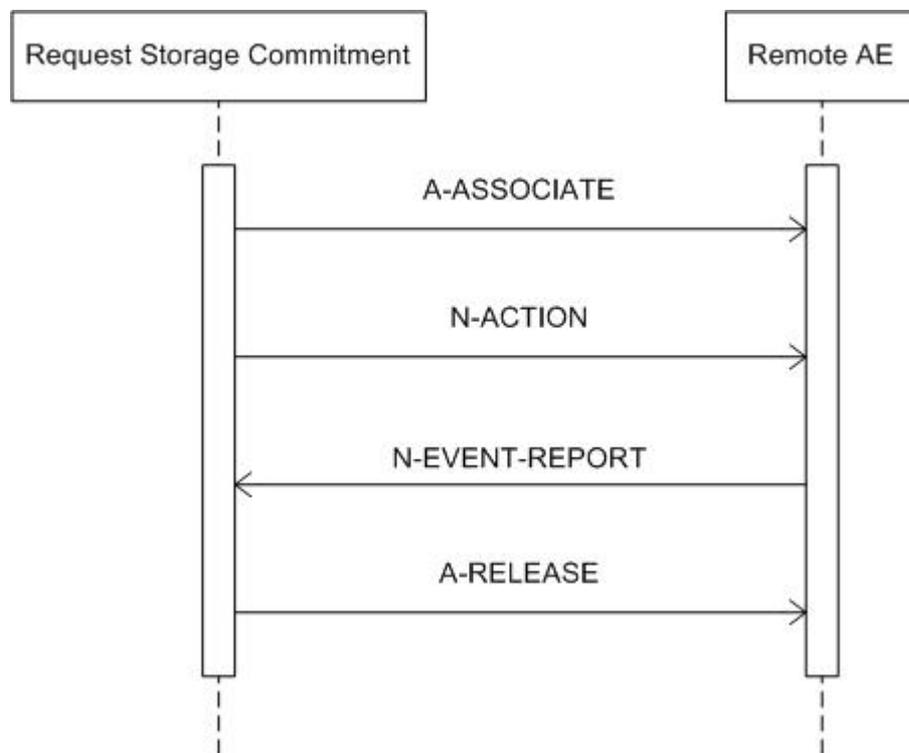
| Exception                | Behavior  |
|--------------------------|---|
| ARTIM Time-out           | The move job fails in case of association setup. The reason is logged and reported to the user.   |
| Reply Time-out           | The move job fails and the association is aborted. The reason is logged and reported to the user. |
| Association Time-out SCU | N/A   |
| Association aborted      | The move job fails. The reason is logged and reported to the user.                                |

**4.2.1.3.4 Request Storage Commitment**

**4.2.1.3.4.1 Description and Sequencing of Activities**

The RWA Request Storage Commitment involves the storage commitment of images on a remote system.

If configured, Storage Commitment will be initiated in a new association after closing the association of the related image storage (C-STORE). This new association will be open until the remote archive sends a storage commitment report (synchronous) or when the configured maximum time is passed. When this maximum configured period is passed, it is the responsibility of the remote archive to setup a new association with ViewForum R4.1 and send the storage commitment report (asynchronous).



**Figure 8: Sequencing of Synchronous RWA Request Storage Commitment**

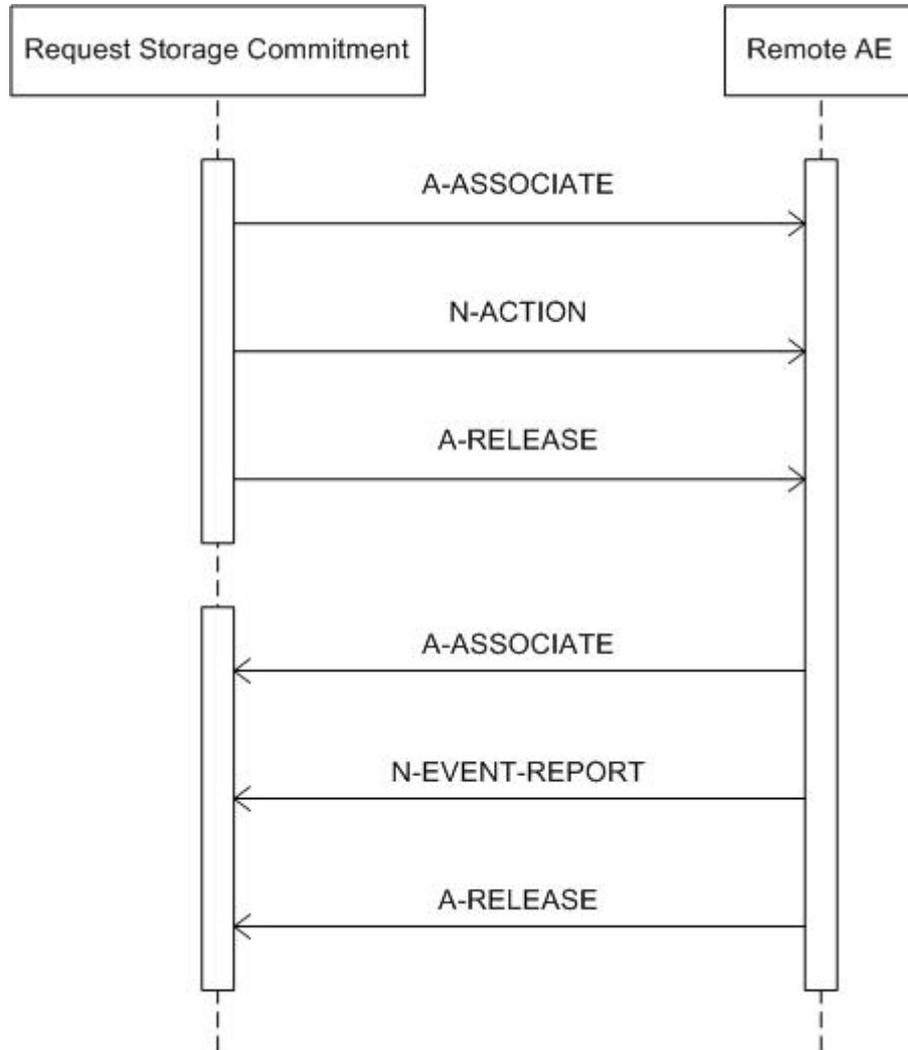


Figure 9: Sequencing of Asynchronous RWA Request Storage Commitment

4.2.1.3.4.2 Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. In this subsection, the Presentation Contexts proposed by the ViewForum AE for Request Storage Commitment are defined in Table 21.

**Table 21: Proposed Presentation Contexts for Request Storage Commitment**

| Presentation Context Table    |                      |                   |   |      |                      |
|-------------------------------|----------------------|-------------------|---|------|----------------------|
| Abstract Syntax               |                      | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                          | UID                  | Name List (note)  | UID List  |      |                      |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

Note: For performance reasons the ELE transfer syntax is preferred.

#### 4.2.1.3.4.3 SOP Specific Conformance for SOP Class

The ViewForum AE provides standard conformance. In ViewForum R 4.1 many remote nodes can be configured for storage Images. Per remote node one node can be configured to deliver the Storage Commitment service.

Following are the details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors.

**Table 22: DICOM Command Response Status Handling Behavior**

| Service Status | Further Meaning    | Error Code | Behavior                                       |
|----------------|--------------------|------------|--|
| Success        | Operation complete | 0000       | Continues with waiting for storage commitment. |
| Failure        | (any failure)      | xxxx       | The reason is logged.                          |

The ViewForum AE does not take any more actions on receiving the N-EVENT-REPORT, even when failures exist (Event Type ID 2).

**Table 23: DICOM Command Communication Failure Behavior**

| Exception                | Behavior  |
|--------------------------|---|
| ARTIM Time-out           | The reason is logged.   |
| Reply Time-out           | The association is released. Continues with waiting for storage commitment. |
| Association Time-out SCU | The association is released. Continues with waiting for storage commitment. |
| Association aborted      | Continues with waiting for storage commitment.                              |

#### 4.2.1.3.5 Print Images`

##### 4.2.1.3.5.1 Description and Sequencing of Activities

The RWA Print Images involves the printing of images by sending the selected images to a Print Management SCP (i.e. printer). After selecting the print destination (out of choice list of configured printers) and some print parameters (depending on the configuration and the selected printer; these values can be configured too), the ViewForum AE shall initiate an association to the selected printer and use it to send the print job. ViewForum R4.1 also has an option for print preview.

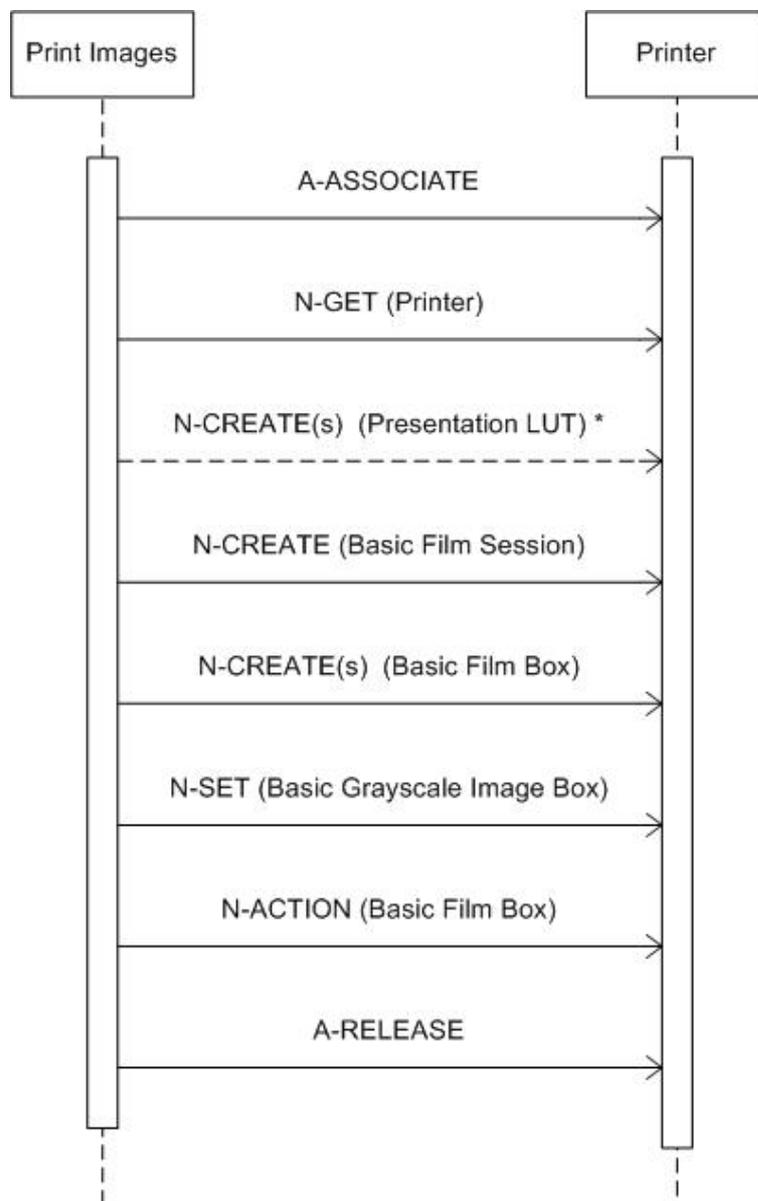


Figure 10: Sequencing of RWA Print Images

- Note that the Presentation LUT SOP class is only supported for Grayscale image printing.

#### 4.2.1.3.5.2 Proposed Presentation Contexts

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. In this subsection, the Presentation Contexts proposed by the ViewForum AE for Print Images are defined in Table 24.

**Table 24: Proposed Presentation Contexts for Print Images**

| Presentation Context Table              |                        |                  |                     |      |                      |
|---|------------------------|------------------|---------------------|------|----------------------|
| Abstract Syntax                         |                        | Transfer Syntax  |                     | Role | Extended Negotiation |
| Name                                    | UID                    | Name List (note) | UID List            |      |                      |
| Basic Grayscale Print Management (Meta) | 1.2.840.10008.5.1.1.9  | ILE              | 1.2.840.10008.1.2   | SCU  | None                 |
|   |                        | ELE              | 1.2.840.10008.1.2.1 |      |                      |
|   |                        | EBE              | 1.2.840.10008.1.2.2 |      |                      |
| Basic Color Print Management (Meta)     | 1.2.840.10008.5.1.1.14 | ILE              | 1.2.840.10008.1.2   | SCU  | None                 |
|   |                        | ELE              | 1.2.840.10008.1.2.1 |      |                      |
|   |                        | EBE              | 1.2.840.10008.1.2.2 |      |                      |
| Presentation LUT                        | 1.2.840.10008.5.1.1.23 | ILE              | 1.2.840.10008.1.2   | SCU  | None                 |
|   |                        | ELE              | 1.2.840.10008.1.2.1 |      |                      |
|   |                        | EBE              | 1.2.840.10008.1.2.2 |      |                      |

Note: For performance reasons the ELE transfer syntax is preferred.

#### Used abbreviations are:

|          |  |
|----------|--|
| ALWAYS   | the module or attribute shall always be present with value                   |
| ANAP     | Attribute Not Always Present   |
| VNAP     | Value Not Always Present (attribute sent zero length if no value is present) |
| EMPTY    | Attribute is sent without a value  |
| MAYBE    | the module may be present under specified condition                          |
| OPTIONAL | the module may be available, depending on source object                      |
| AUTO     | the attribute value is generated automatically                               |
| CONF     | the attribute value source is a configurable parameter                       |
| IMPL     | the attribute value source is a user-implicit configuration setting          |
| SPEC     | the attribute value source is a specific DICOM object                        |
| USER     | the attribute value source is explicit user input                            |

#### 4.2.1.3.5.3 SOP Specific Conformance Printer SOP Class

The Printer process conforms to the Printer Sop Class.

The following DIMSE service element is supported:

#### N-GET

N-GET DIMSE does not create any Data Set Attributes.

The behavior on successful and unsuccessful transfer is given in the table below.

**Table 25: DICOM Command Response Status Handling Behavior for Printer N-GET**

| Service Status | Further Meaning      | Error Code | Behavior  |
|----------------|----------------------|------------|---|
| Success        | Successful operation | 0000       | The print job continues.  |
| Warning        | (any warning)        | xxxx       | The print job continues and the warning is logged.                                |
| Failure        | (any failure)        | xxxx       | The print job is marked as failed, the reason is logged and reported to the user. |

**4.2.1.3.5.4 SOP Specific Conformance Basic Film Session SOP Class**

The Printer process conforms to the Basic Film Session Sop Class.  
The following DIMSE service element is supported:

**N-CREATE**

The following table lists the supported attributes for the N-CREATE DIMSE.

**Table 26: Basic Film Session Presentation Module**

| Attribute Name     | Tag       | VR | Value                        | Presence of Value | Source    |
|--------------------|-----------|----|------------------------------|-------------------|-----------|
| Number of Copies   | 2000,0010 | IS | 1 to 99                      | ALWAYS            | USER/IMPL |
| Print Priority     | 2000,0020 | CS | HIGH                         | ALWAYS            | USER/IMPL |
| Medium Type        | 2000,0030 | CS | BLUE FILM, CLEAR FILM, PAPER | ALWAYS            | IMPL      |
| Film Destination   | 2000,0040 | CS | MAGAZINE, PROCESSOR          | ALWAYS            | IMPL      |
| Film Session Label | 2000,0050 | LO | Philips Medical Systems      | ALWAYS            | AUTO      |

The behavior on successful and unsuccessful transfer is given in the table below.

**Table 27: DICOM Command Response Status Handling Behavior for Basic Film Session N-CREATE**

| Service Status | Further Meaning                   | Error Code | Behavior   |
|----------------|-----------------------------------|------------|--|
| Success        | Film Session successfully created | 0000       | The print job continues.                           |
| Warning        | Memory Allocation not supported   | B600       | The print job continues and the warning is logged. |

**4.2.1.3.5.5 SOP Specific Conformance Basic Film Box SOP Class**

The Printer process conforms to the Basic Film Box Sop Class.  
The following DIMSE service elements are supported:

**N-CREATE  
N-ACTION**

The following table lists the supported attributes for the N-CREATE DIMSE

**Table 28: Basic Film Box Presentation Module**

| Attribute Name            | Tag       | VR | Value   | Presence of Value | Source |
|---------------------------|-----------|----|---|-------------------|--------|
| Image Display Format      | 2010,0010 | ST | STANDARD\1,1 CUSTOM\1   | ALWAYS            | CONF   |
| Film Orientation          | 2010,0040 | CS | PORTRAIT; LANDSCAPE   | ALWAYS            | CONF   |
| Film Size ID              | 2010,0050 | CS | A, A3, A4, 8INX10IN, 8_5INX11IN, 10INX12IN, 10INX14IN, 11INX14IN, 11INX17IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM | ALWAYS            | CONF   |
| Max Density               | 2010,0130 | US |   | VNAP              | CONF   |
| Trim                      | 2010,0140 | CS | NO, YES   | VNAP              | CONF   |
| Configuration Information | 2010,0150 | ST | L=1, L=V  | ALWAYS            | CONF   |

**Table 29: Basic Film Box Relationship Module**

| Attribute Name                       | Tag       | VR | Value                          | Presence of Value | Source |
|--------------------------------------|-----------|----|--------------------------------|-------------------|--------|
| Referenced Film Session Sequence     | 2010,0500 | SQ |                                | ALWAYS            | AUTO   |
| >Referenced SOP Class UID            | 0008,1150 | UI | UID of Parent Film Session     | ALWAYS            | AUTO   |
| >Referenced SOP Instance UID         | 0008,1155 | UI |                                | ALWAYS            | AUTO   |
| Referenced Presentation LUT Sequence | 2050,0500 | SQ |                                | ANAP              | AUTO   |
| >Referenced SOP Class UID            | 0008,1150 | UI | UID of Parent LUT Presentation | ALWAYS            | AUTO   |
| >Referenced SOP Instance UID         | 0008,1155 | UI |                                | ALWAYS            | AUTO   |

The behavior on successful and unsuccessful transfer is given in the table below.

**Table 30: DICOM Command Response Status Handling Behavior for Basic Film Box N-CREATE**

| Service Status | Further Meaning   | Error Code | Behavior  |
|----------------|---|------------|---|
| Success        | Film Box successfully created   | 0000       | The print job continues.                                    |
| Warning        | Requested Min Density or Max Density outside of Printer's operating Range | B605       | The print job continues and the warning is logged.          |
| Failure        | There is an existing Film Box that has not been printed                   | C616       | The print job is marked as failed and the reason is logged. |

N-ACTION DIMSE does not create any Data Set Attributes.

The behavior on successful and unsuccessful transfer is given in the table below.

**Table 31: DICOM Command Response Status Handling Behavior for Basic Film Box N-ACTION**

| Service Status | Further Meaning   | Error Code | Behavior   |
|----------------|---|------------|--|
| Success        | Film accepted for printing  | 0000       | The print job continues.   |
| Warning        | Film Box SOP Instance Hierarchy does not contain Image Box SOP Instances  | B603       | The print job continues and the warning is logged and reported to the user.          |
|                | Image Size is larger than Image Box Size – The Image has been de-magnified  | B604       | The print job continues and the warning is logged and reported to the user.          |
|                | Image Size is larger than Image Box Size – The Image has been cropped to fit  | B609       | The print job continues and the warning is logged and reported to the user.          |
|                | Image Size or combined Print Image Size is larger than Image Box Size – The Image or combined Print Image has been decimated to fit | B60A       | The print job continues and the warning is logged and reported to the user.          |
| Failure        | Unable to create Print Job SOP Instance – Print Queue is full   | C602       | The print job is marked as failed and the reason is logged and reported to the user. |
|                | Image Size is larger than Image Box Size  | C603       | The print job is marked as failed and the reason is logged and reported to the user. |
|                | Combined Print Image Size is larger than Image Box Size   | C613       | The print job is marked as failed and the reason is logged and reported to the user. |

#### 4.2.1.3.5.6 SOP Specific Conformance Basic Grayscale Image Box SOP Class

The Printer process conforms to the Basic Grayscale Image Box Sop Class.  
The following DIMSE service element is supported:

##### N-SET

The following table lists the supported attributes for the N-SET DIMSE

**Table 32: Basic Grayscale Image Box SOP Class - N-SET-RQ - Pixel Presentation Module**

| Attribute Name                 | Tag       | VR | Value       | Presence of Value | Source |
|--------------------------------|-----------|----|-------------|-------------------|--------|
| Image Position                 | 2020,0010 | US | 1           | ALWAYS            | AUTO   |
| Polarity                       | 2020,0020 | CS | NORMAL      | ALWAYS            | AUTO   |
| Basic Grayscale Image Sequence | 2020,0110 | SQ |             | ALWAYS            | AUTO   |
| >Samples per Pixel             | 0028,0002 | US | 1           | ALWAYS            | AUTO   |
| >Photometric Interpretation    | 0028,0004 | CS | MONOCHROME2 | ALWAYS            | AUTO   |
| >Rows                          | 0028,0010 | US |             | ALWAYS            | IMPL   |
| >Columns                       | 0028,0011 | US |             | ALWAYS            | IMPL   |
| >Bits Allocated                | 0028,0100 | US | 8, 16       | ALWAYS            | AUTO   |
| >Bits Stored                   | 0028,0101 | US | 8,12        | ALWAYS            | IMPL   |

|                       |           |           |      |        |      |
|-----------------------|-----------|-----------|------|--------|------|
| >High Bit             | 0028,0102 | US        | 7,11 | ALWAYS | AUTO |
| >Pixel Representation | 0028,0103 | US        | 0    | ALWAYS | AUTO |
| >Pixel Data           | 7FE0,0010 | OB/<br>OW |      | ALWAYS | AUTO |

The behavior on successful and unsuccessful transfer is given in the table below.

**Table 33: DICOM Command Response Status Handling Behavior for Basic Grayscale Image Box N-SET**

| Service Status | Further Meaning   | Error Code | Behavior  |
|----------------|---|------------|---|
| Success        | Image successfully stored in Image Box  | 0000       | The print job continues.  |
| Warning        | Image Size is larger than Image Box Size – The Image has been de-magnified  | B604       | The print job continues and the warning is logged and reported to the user.         |
|                | Requested Min Density or Max Density outside of Printer's operating Range   | B605       | The print job continues and the warning is logged and reported to the user.         |
|                | Image Size is larger than Image Box Size – The Image has been cropped to fit  | B609       | The print job continues and the warning is logged and reported to the user.         |
|                | Image Size or combined Print Image Size is larger than Image Box Size – The Image or combined Print Image has been decimated to fit | B60A       | The print job continues and the warning is logged and reported to the user.         |
| Error          | Image Size is larger than Image Box Size  | C603       | The print job is marked as failed and the reason is logged and reported to the user |
|                | Insufficient Memory in Printer to store the Image   | C605       | The print job is marked as failed and the reason is logged and reported to the user |
|                | Combined Print Image Size is larger than Image Box Size   | C613       | The print job is marked as failed and the reason is logged and reported to the user |

#### 4.2.1.3.5.7 SOP Specific Conformance Basic Color Image Box SOP Class

The Printer process conforms to the Basic Color Image Box Sop Class.  
The following DIMSE service element is supported:

#### N-SET

The following table lists the supported attributes for the N-SET DIMSE

**Table 34: Basic Color Image Box SOP Class - N-SET-RQ - Pixel Presentation Module**

| Attribute Name              | Tag       | VR | Value  | Presence of Value | Source |
|-----------------------------|-----------|----|--------|-------------------|--------|
| Image Position              | 2020,0010 | US | 1      | ALWAYS            | AUTO   |
| Polarity                    | 2020,0020 | CS | NORMAL | ALWAYS            | AUTO   |
| Basic Color Image Sequence  | 2020,0111 | SQ |        | ALWAYS            | AUTO   |
| >Samples per Pixel          | 0028,0002 | US | 3      | ALWAYS            | AUTO   |
| >Photometric Interpretation | 0028,0004 | CS | RGB    | ALWAYS            | AUTO   |
| >Planar Configuration       | 0028,0006 | US | 0,1    | ALWAYS            | IMPL   |
| >Rows                       | 0028,0010 | US |        | ALWAYS            | IMPL   |
| >Columns                    | 0028,0011 | US |        | ALWAYS            | IMPL   |
| >Bits Allocated             | 0028,0100 | US | 8      | ALWAYS            | AUTO   |
| >Bits Stored                | 0028,0101 | US | 8      | ALWAYS            | IMPL   |
| >High Bit                   | 0028,0102 | US | 7      | ALWAYS            | AUTO   |
| >Pixel Representation       | 0028,0103 | US | 0      | ALWAYS            | AUTO   |
| >Pixel Data                 | 7FE0,0010 | OW |        | ALWAYS            | AUTO   |

The behavior on successful and unsuccessful transfer is given in the table below.

**Table 35: DICOM Command Response Status Handling Behavior for Basic Color Image Box N-SET**

| Service Status | Further Meaning   | Error Code | Behavior   |
|----------------|---|------------|--|
| Success        | Image successfully stored in Image Box  | 0000       | The print job continues.   |
| Warning        | Image Size is larger than Image Box Size – The Image has been de-magnified  | B604       | The print job continues and the warning is logged and reported to the user.          |
|                | Requested Min Density or Max Density outside of Printer's operating Range   | B605       | The print job continues and the warning is logged and reported to the user.          |
|                | Image Size is larger than Image Box Size – The Image has been cropped to fit  | B609       | The print job continues and the warning is logged and reported to the user.          |
|                | Image Size or combined Print Image Size is larger than Image Box Size – The Image or combined Print Image has been decimated to fit | B60A       | The print job continues and the warning is logged and reported to the user.          |
| Error          | Image Size is larger than Image Box Size  | C603       | The print job is marked as failed and the reason is logged and reported to the user. |
|                | Insufficient Memory in Printer to store the Image   | C605       | The print job is marked as failed and the reason is logged and reported to the user. |
|                | Combined Print Image Size is larger than Image Box Size   | C613       | The print job is marked as failed and the reason is logged and reported to the user. |

#### 4.2.1.3.5.8 SOP Specific Conformance Presentation LUT SOP Class

The Printer process conforms to the Presentation LUT Sop Class.  
The following DIMSE service element is supported:

##### N-CREATE

The following table lists the supported attributes for the N-CREATE DIMSE

**Table 36: Presentation LUT Module**

| Attribute Name         | Tag       | VR | Value    | Presence of Value | Source |
|------------------------|-----------|----|----------|-------------------|--------|
| Presentation LUT Shape | 2050,0020 | CS | IDENTITY | ALWAYS            | AUTO   |

The behavior on successful and unsuccessful transfer is given in the table below.

**Table 37: DICOM Command Response Status Handling Behavior for Presentation LUT N-CREATE**

| Service Status | Further Meaning  | Error Code | Behavior   |
|----------------|--|------------|--|
| Success        | Presentation LUT successfully created  | 0000       | The print job continues.                           |
| Warning        | Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead. | B605       | The print job continues and the warning is logged. |

**Table 38: DICOM Command Response Status Handling Behavior for Printer N-EVENT-REPORT**

| Service Status | Further Meaning      | Error Code | Behavior   |
|----------------|----------------------|------------|--|
| Normal         | Successful operation | 0000       | The print job is marked as completed.  |
| Warning        | (any warning)        | xxxx       | The print job is marked as completed and the warning is logged and reported to the user. |
| Failure        | (any failure)        | xxxx       | The print job is marked as failed and the reason is logged and reported to the user      |

The behavior of the AE during communication failure is summarized in Table 39.

**Table 39: DICOM Command Communication Failure Behavior**

| Exception                | Behavior  |
|--------------------------|---|
| ARTIM Time-out           | Print job fails.  |
| Reply Time-out           | The association is released.  |
| Association Time-out SCU | The association is released.  |
| Association aborted      | The Print job is marked as failed. The reason is logged and reported to the user. |

**4.2.1.3.6 Request Printer Status**

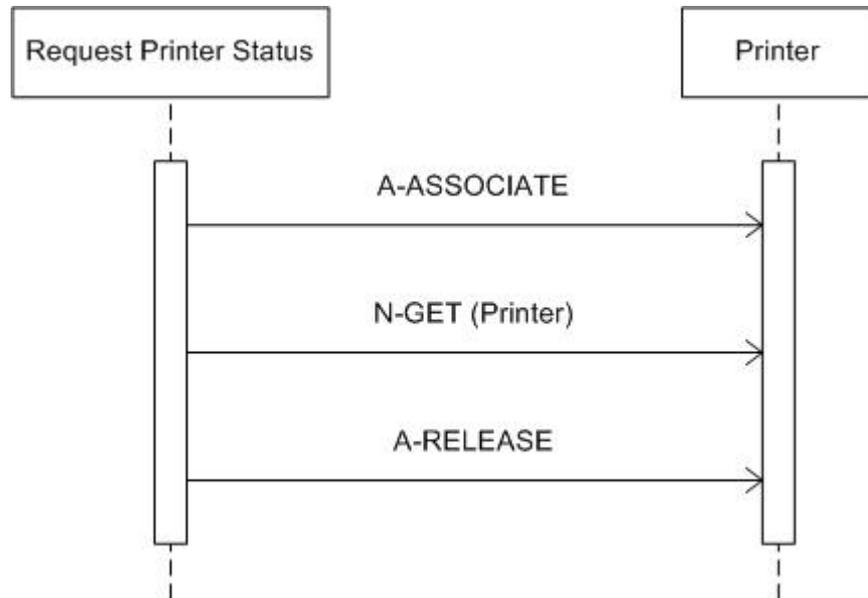
**4.2.1.3.6.1 Description and Sequencing of Activities**

The RWA Request Printer Status involves the request for the printer status of the configured Print Management SCP's (i.e. printers).

The ViewForum AE will periodically request the printer status. If an association already exists for a print job (RWA Print Images) then the ViewForum AE shall use this association, otherwise a new association shall be initiated.

The status codes as returned by the printer shall be logged for service purposes and shall not be shown on the GUI.

The Printer Status Tool may be used to reveal the received printer status.



**Figure 11: Sequencing of RWA Request Printer Status**

**4.2.1.3.6.2 Proposed Presentation Contexts**

Each time an association is initiated, the association initiator proposes a number of Presentation Contexts to be used on that association. In this subsection, the Presentation Contexts proposed by the ViewForum AE for Request Printer Status are defined in Table 40.

**Table 40: Proposed Presentation Contexts for Request Printer Status**

| Presentation Context Table |                        |                   |   |      |                      |
|----------------------------|------------------------|-------------------|---|------|----------------------|
| Abstract Syntax            |                        | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                       | UID                    | Name List (note)  | UID List  |      |                      |
| Printer                    | 1.2.840.10008.5.1.1.16 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

Note: For performance reasons the ELE transfer syntax is preferred and shall be chosen in case multiple Transfer Syntaxes are accepted in the Association Acceptance

#### 4.2.1.3.6.3 SOP Specific Conformance for SOP Class

The ViewForum AE provides standard conformance to the Printer SOP class.

All details regarding the specific conformance, including response behavior to all status codes, both from an application level and communication errors are provided in Table 41.

**Table 41: DICOM Command Response Status Handling Behavior**

| Service Status | Further Meaning      | Error Code | Behavior  |
|----------------|----------------------|------------|---|
| Success        | Matching is complete | 0000       | The print job continues.  |
| Warning        | (any warning)        | xxxx       | The print job continues and the warning is logged and reported to the user.       |
| Error          | (any failure)        | xxxx       | The print job is marked as failed. The reason is logged and reported to the user. |

The behavior of the AE during communication failure is summarized in Table 42.

**Table 42: DICOM Command Communication Failure Behavior**

| Exception                | Behavior  |
|--------------------------|---|
| ARTIM Timeout            | Print job fails.  |
| Reply Time-out           | The association is released.  |
| Association Time-out SCU | The association is released.  |
| Association aborted      | The print job is marked as failed. The reason is logged and reported to the user. |

#### 4.2.1.4 Association Acceptance Policy

ViewForum R4.1 shall accept Associations for the following purposes:

- To allow remote applications to verify application level communication with ViewForum R4.1; ref. section 4.2.1.4.1 Request Verification.
- To allow remote applications to store images in the ViewForum R4.1 database (i.e. image import); ref. section 4.2.1.4.2 Import Images.
- To allow remote applications to query the ViewForum R4.1 database; ref. section 4.2.1.4.3 Query Local Images.
- To allow remote applications to retrieve images from the ViewForum R4.1 database; ref. section 4.2.1.4.4 Retrieve Local Images.

The ViewForum AE shall reject association requests from unknown applications, i.e. applications that offer an unknown "calling AE title". An application is known if – and only if – it is defined during configuration of the ViewForum system.

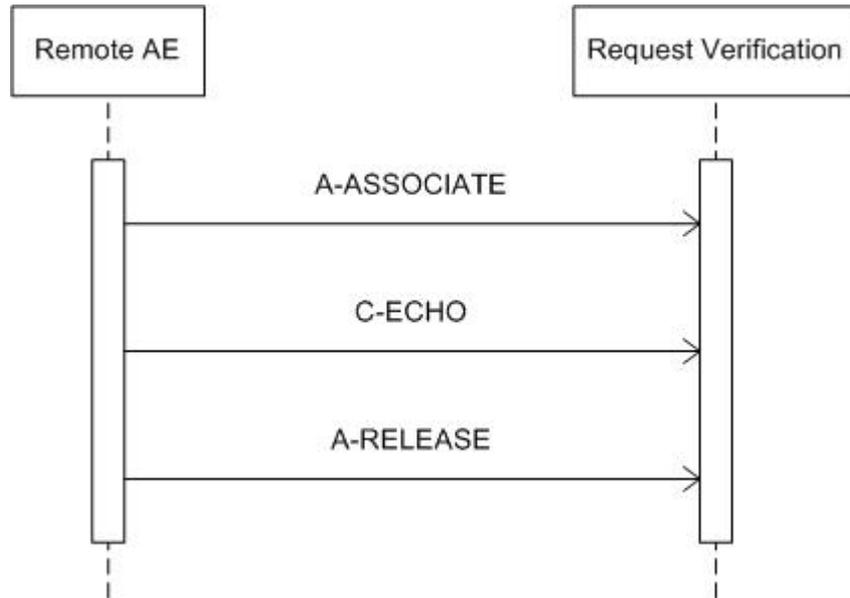
The ViewForum AE shall reject association requests from applications that do not address the ViewForum AE, i.e. applications that offer a wrong "called AE title".

The ViewForum AE title is defined during configuration of the ViewForum system.

**4.2.1.4.1 Request Verification**

**4.2.1.4.1.1 Description and Sequencing of Activities**

The ViewForum AE shall accept associations from systems that wish to verify application level communication using the C-ECHO command.



**Figure 12: Sequencing of RWA Request Verification**

**4.2.1.4.1.2 Accepted Presentation Contexts**

The ViewForum AE shall be able to accept the presentation contexts as specified in the next table.

**Table 43: Acceptable Presentation Contexts for Request Verification**

| Presentation Context Table |                   |                   |   |      |                      |
|----------------------------|-------------------|-------------------|---|------|----------------------|
| Abstract Syntax            |                   | Transfer Syntax   |   | Role | Extended Negotiation |
| Name                       | UID               | Name List         | UID List  |      |                      |
| Verification               | 1.2.840.10008.1.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |

For performance reasons the ELE transfer syntax is preferred and shall be chosen in case multiple Transfer Syntaxes are proposed in the Association Negotiation.

The ViewForum AE shall accept all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that the ViewForum AE accepts multiple proposed Presentation Contexts with the same SOP class but different Transfer Syntaxes.

There is no check for duplicate contexts, and these will therefore be accepted.

**4.2.1.4.1.3 SOP Specific Conformance for SOP Class**

The ViewForum AE provides standard conformance to the Verification service class.

The behavior of an Application Entity shall be summarized as shown in Table 44. The standard as well as the manufacturer specific status codes and their corresponding behavior shall be specified.

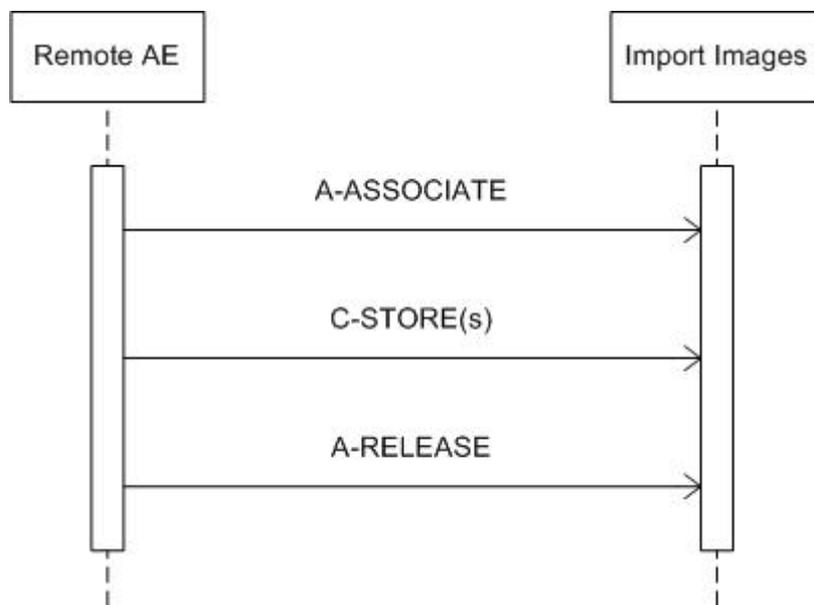
**Table 44: Verification C-ECHO Response Status Handling Behavior**

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|-----------------|------------|----------|
| N/A            |                 |            |          |

**4.2.1.4.2 Import Images**

**4.2.1.4.2.1 Description and Sequencing of Activities**

The ViewForum AE shall accept associations from systems that wish to store images in the ViewForum R4.1 database using the C-STORE command.



**Figure 13: Sequencing of RWA Import Images**

**4.2.1.4.2.2 Accepted Presentation Contexts**

The ViewForum AE shall be able to accept the presentation contexts as specified in the next table.

Table 45: Acceptable Presentation Contexts for Import Images

| Presentation Context Table                     |                              |                   |   |      |                      |
|--|------------------------------|-------------------|---|------|----------------------|
| Abstract Syntax                                |                              | Transfer Syntax   |   | Role | Extended Negotiation |
| Name   | UID                          | Name List (note)  | UID List  |      |                      |
| Computed Radiography Image Storage             | 1.2.840.10008.5.1.4.1.1.1    | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| Digital X-Ray Image Storage – for Presentation | 1.2.840.10008.5.1.4.1.1.1.1  | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| CT Image Storage                               | 1.2.840.10008.5.1.4.1.1.2    | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| MR Image Storage                               | 1.2.840.10008.5.1.4.1.1.4    | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| Secondary Capture Image Storage                | 1.2.840.10008.5.1.4.1.1.7    | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| Grayscale Softcopy Presentation State Storage  | 1.2.840.10008.5.1.4.1.1.11.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| X-Ray Angiographic Image Storage               | 1.2.840.10008.5.1.4.1.1.12.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| X-Ray Radiofluoroscopic Image Storage          | 1.2.840.10008.5.1.4.1.1.12.2 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| Specialized X-Ray                              | 1.3.46.670589.2.3.1.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| CX Image                                       | 1.3.46.670589.2.4.1.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| 3D Volume Storage                              | 1.3.46.670589.5.0.1.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| 3D Volume Object Storage                       | 1.3.46.670589.5.0.2.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| Surface Storage                                | 1.3.46.670589.5.0.3.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| MR cardio Storage                              | 1.3.46.670589.5.0.8.1        | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| CT Synthetic Image                             | 1.3.46.670589.5.0.9          | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| MR Synthetic Image                             | 1.3.46.670589.5.0.10         | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| MR Cardio Analysis Storage                     | 1.3.46.670589.5.0.11.1       | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| CX Synthetic Image                             | 1.3.46.670589.5.0.12         | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |

| Presentation Context Table            |                             |  |   |      |                      |
|---------------------------------------|-----------------------------|--|---|------|----------------------|
| Abstract Syntax                       |                             | Transfer Syntax                                |   | Role | Extended Negotiation |
| Name                                  | UID                         | Name List (note)                               | UID List  |      |                      |
| Perfusion                             | 1.3.46.670589.5.0.13        | ILE<br>ELE<br>EBE                              | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2                               | SCP  | None                 |
| Perfusion Analysis                    | 1.3.46.670589.5.0.14        | ILE<br>ELE<br>EBE                              | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2                               | SCP  | None                 |
| Ultra sound Multi-frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | ILE<br>ELE<br>EBE<br>JPEG<br>Baseline (Note 1) | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2<br>1.2.840.10008.1.2.4<br>.50 | SCP  | None                 |
| Ultra sound Image Storage             | 1.2.840.10008.5.1.4.1.1.6.1 | ILE<br>ELE<br>EBE<br>JPEG<br>Baseline (Note 1) | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2<br>1.2.840.10008.1.2.4<br>.50 | SCP  | None                 |

Note : For performance reasons the ELE transfer syntax is preferred and shall be chosen in case multiple Transfer Syntaxes are proposed in the Association Negotiation

Note 1 : Only for Photometric Interpretation of RGB and YBR\_FULL\_422. Therefore JPEG Baseline transfer syntax may NOT be configured for SCU systems that are capable of handling storage of monochrome images too.

The ViewForum AE shall accept all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that the ViewForum AE accepts multiple proposed Presentation Contexts with the same SOP class but different Transfer Syntaxes.

There is no check for duplicate contexts, and these will therefore be accepted.

#### 4.2.1.4.2.3 SOP Specific Conformance for SOP Classes

The ViewForum AE provides standard level 1 (Base) conformance to the Storage service class.

If the ViewForum AE imports an image and during the association negotiation the Presentation State SOP class was not negotiated, then the ViewForum AE creates a Presentation State instance for the imported image.

The following table gives an overview of the image formats that can be viewed or stored.

**Table 46: Support for Photometric Interpretation**

| Photometric Interpretation | Storage | Viewing |
|----------------------------|---------|---------|
| MONOCHROME1                | ✓       | ✓       |
| MONOCHROME2                | ✓       | ✓       |
| RGB                        | ✓       | ✓       |
| YBR_FULL                   | ✓       | -       |
| YBR_FULL_422               | ✓ *     | ✓ *     |
| YBR_PARTIAL_422            | ✓       | -       |
| PALETTE COLOR              | ✓       | -       |
| Other                      | ✓       | -       |

- *Compressed YBR\_FULL\_422 images received per JPEG Baseline transfer shall be stored (and consequently viewed) as RGB images.*

If the ViewForum AE receives improper DICOM, ViewForum R4.1 tries as much as possible to make it proper DICOM (if configured to do so). But ViewForum R4.1 also tries to remain as transparent as possible on images; on export the images must be changed only to such extent as really necessary. Therefore it is not guaranteed that all DICOM violations of incoming images are repaired (e.g. enumerated values are not changed).

Thus improper DICOM import may result in improper DICOM export from the ViewForum AE (no checks are available for incorrect UIDs, Date/Time formats, etc.).

ViewForum R4.1 stores all additional standard, private and retired attributes in received images. Retrieval of these attributes VR's is only possible (by means of a C-STORE) if the following conditions are satisfied:

- The image was encoded (when ViewForum R4.1 was C-STORE SCP) using one of the explicit value representations; or
- The image was encoded (when ViewForum R4.1 was C-STORE SCP) using implicit value representation and the destination (i.e. a remote C-STORE SCP) has accepted implicit value representation as the only transfer syntax applicable to the storage SOP class of the image (with ViewForum R4.1 as C-STORE SCU).

Otherwise the VR shall be set to unknown (UN).

#### **Important implementation remarks and restrictions:**

- The DICOM standard does not guarantee that the advanced ViewForum R4.1 applications can process the received images. This depends on the presence and consistency of a set of attributes in these images. The conditions for running the ViewForum R4.1 applications shall be specified in separate Annexes.
- See section 8.1.3, Coerced/Modified fields, for details on coerced and modified attributes.
- When the location of a graphic or text annotation is specified relatively with regards to the displayed area. (i.e. DICOM attribute: Bounding Box Annotation Units, Anchor Point Annotation Units or Graphic Annotation Units equals "DISPLAY"), the annotation is not displayed.

- Areas occluded by shutter are always black in ViewForum R4.1, whereas it is possible to want it to be white in DICOM.

The response status behavior of the ViewForum AE is as described in Table 47. The standard as well as the manufacturer specific status codes and their corresponding behavior shall be specified.

**Table 47: Storage C-STORE Response Status Handling Behavior**

| Service Status | Further Meaning                   | Error Code | Behavior   |
|----------------|-----------------------------------|------------|--|
| Success        | Storage is complete               | 0000       | The image(s) shall be stored in the ViewForum R4.1 database.   |
| Refused        | Out of Resources                  | A700       | The ViewForum R4.1 database is full – recovery from this condition is left to the SCU. ViewForum R4.1 shall send a notification, log the condition, and abort the association. |
| Error          | Data set does not match SOP class | A900       | The SOP class of the image(s) does not match the negotiated abstract syntax. ViewForum R4.1 shall send a notification, log the condition, and abort the association.           |
|                | Cannot understand                 | C000       | The image(s) cannot be parsed. ViewForum R4.1 shall send a notification, log the condition, and abort the association.   |
| Warning        | Coercion of Data Elements         | B000       | N/A  |
|                | Elements discarded                | B006       | N/A  |
|                | Data set does not match SOP class | B007       | N/A  |

#### 4.2.1.4.3 Query Local Images

##### 4.2.1.4.3.1 Description and Sequencing of Activities

The ViewForum AE shall accept associations from systems that wish to query the ViewForum R4.1 database using the C-FIND command.

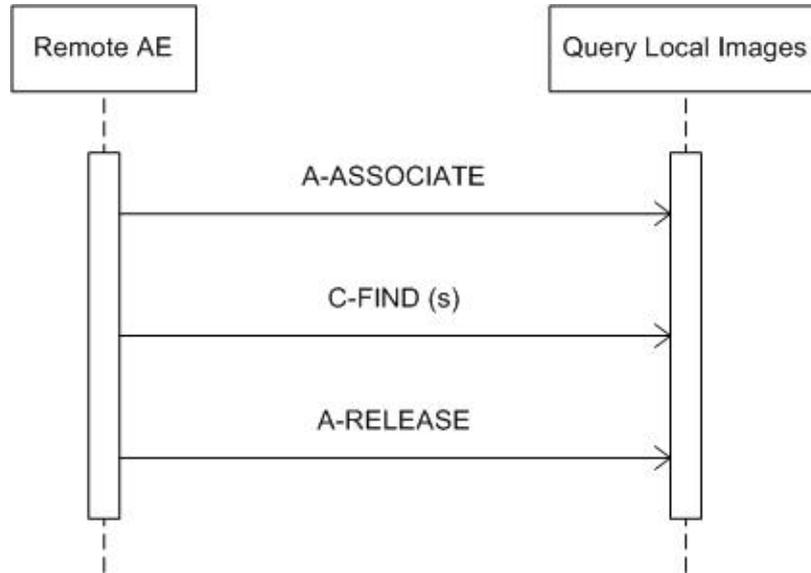


Figure 14: Sequencing of RWA Query Local Images

4.2.1.4.3.2 Accepted Presentation Contexts

The ViewForum AE shall be able to accept the presentation contexts as specified in the next table.

Table 48: Acceptable Presentation Contexts for Query Local Images

| Presentation Context Table                                 |                             |                   |   |      |                      |
|--|-----------------------------|-------------------|---|------|----------------------|
| Abstract Syntax  |                             | Transfer Syntax   |   | Role | Extended Negotiation |
| Name   | UID                         | Name List (note)  | UID List  |      |                      |
| Patient Root Query /Retrieve Information Model - FIND      | 1.2.840.10008.5.1.4.1.2.1.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| Study Root Query /Retrieve Information Model - FIND        | 1.2.840.10008.5.1.4.1.2.2.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |
| Patient/Study Only Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.3.1 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCP  | None                 |

Note : For performance reasons the ELE transfer syntax is preferred and shall be chosen in case multiple Transfer Syntaxes are proposed in the Association Negotiation

The ViewForum AE shall accept all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that the ViewForum AE accepts multiple proposed Presentation Contexts with the same SOP class but different Transfer Syntaxes.

There is no check for duplicate contexts, and these will therefore be accepted.

#### 4.2.1.4.3.3 SOP Specific Conformance for SOP Classes

The ViewForum AE provides standard conformance to the Query/Retrieve service class. Relational queries are not supported. The ViewForum AE shall handle simultaneous C-FIND requests simultaneously.

The ViewForum R4.1 database distinguishes two patients with the same Patient ID but different Patient's Name or Patient's Birth Date. However, the DICOM Query/Retrieve service class has Patient ID as a unique key at Patient level, and thus two patients with the same Patient ID cannot be distinguished via a standard DICOM Query.

The following query keys shall be supported.

**Table 49: Supported Query Keys**

| Query Level | Query Key           |             | Standard Matching |
|-------------|---------------------|-------------|-------------------|
|             | Name                | Tag         |                   |
| Patient     | Patient's Name      | (0010,0010) | ✓                 |
|             | Patient ID          | (0010,0020) | ✓                 |
| Study       | Study Date          | (0008,0020) | ✓                 |
|             | Study Time          | (0008,0030) | ✓                 |
|             | Accession Number    | (0008,0050) | ✓                 |
|             | Study Instance UID  | (0020,000D) | ✓                 |
|             | Study ID            | (0020,0010) | ✓                 |
| Series      | Modality            | (0008,0060) | ✓                 |
|             | Series Instance UID | (0020,000E) | ✓                 |
|             | Series Number       | (0020,0011) | ✓                 |
| Image       | SOP Instance UID    | (0008,0018) | ✓                 |
|             | Instance Number     | (0020,0013) | ✓                 |

When querying optional keys the ViewForum R4.1 will respond successfully for available keys if queried per **universal matching**; otherwise it will respond with warning.

Note that when querying optional keys with **non-universal matching** the ViewForum R4.1 will return information using universal matching for those keys.

Note that when a query is performed per Patient/Study Only Query/Retrieve Information Model SOP class on Patient Level, the ViewForum R4.1 always sends back the attribute "Patient's Name" (0010,0010), also when it was not requested.

The response status behavior of the ViewForum AE is as described in Table 50. The standard as well as the manufacturer specific status codes and their corresponding behavior shall be specified.

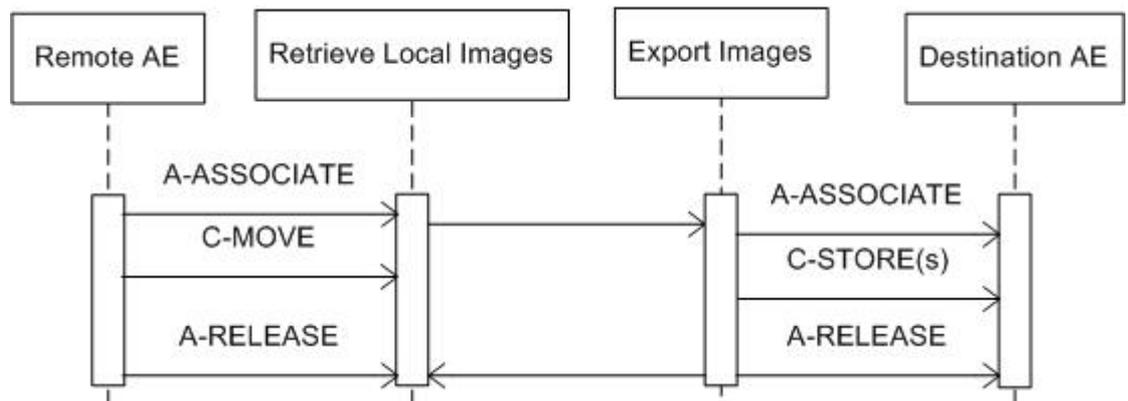
**Table 50: Query/Retrieve C-FIND Response Status Handling Behavior**

| Service Status | Further Meaning  | Error Code | Behavior   |
|----------------|--|------------|--|
| Success        | Matching is complete   | 0000       | The C-FIND request handling is completed, no more C-FIND responses are sent. |
| Refused        | Out of Resources   | A700       | N/A  |
| Failed         | Identifier does not match SOP class  | A900       | N/A  |
|                | Unable to process  | C000       | The C-FIND request cannot be parsed. ViewForum R4.1 logs the reason.         |
| Cancel         | Matching terminated due to Cancel Request  | FE00       | The C-FIND request is canceled, no more C-FIND responses are sent.           |
| Pending        | Matches are continuing – Current match is supplied and any optional keys were supported in the same manner as required keys          | FF00       | The C-FIND responses are continuing.   |
|                | Matches are continuing – Warning that one or more optional keys were not supported for existence and/or matching for this identifier | FF01       | The C-FIND responses are continuing.   |

**4.2.1.4.4 Retrieve Local Images**

**4.2.1.4.4.1 Description and Sequencing of Activities**

The ViewForum AE shall accept associations from systems that wish to retrieve images from the ViewForum R4.1 database using the C-MOVE command.



**Figure 15: Sequencing of RWA Retrieve Local Images**

After RWA Retrieve Local Images the RWA Export Images is started; the RWA Export Images is described in section 4.2.1.3.1.

#### 4.2.1.4.4.2 Accepted Presentation Contexts

The ViewForum AE shall be able to accept the presentation contexts as specified in the next table.

**Table 51: Acceptable Presentation Contexts for Retrieve Local Images**

| Presentation Context Table                                 |                             |                   |   |      |                      |
|--|-----------------------------|-------------------|---|------|----------------------|
| Abstract Syntax  |                             | Transfer Syntax   |   | Role | Extended Negotiation |
| Name   | UID                         | Name List (note)  | UID List  |      |                      |
| Patient Root Query /Retrieve Information Model - MOVE      | 1.2.840.10008.5.1.4.1.2.1.2 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Study Root Query /Retrieve Information Model - MOVE        | 1.2.840.10008.5.1.4.1.2.2.2 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |
| Patient/Study Only Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.3.2 | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

Note : For performance reasons the ELE transfer syntax is preferred and shall be chosen in case multiple Transfer Syntaxes are proposed in the Association Negotiation

The ViewForum AE shall accept all contexts in the intersection of the proposed and acceptable Presentation Contexts. This means that the ViewForum AE accepts multiple proposed Presentation Contexts with the same SOP class but different Transfer Syntaxes.

There is no check for duplicate contexts, and these will therefore be accepted.

#### 4.2.1.4.4.3 SOP Specific Conformance for SOP Classes

The response status behavior of the ViewForum AE is as described in Table 52. The standard as well as the manufacturer specific status codes and their corresponding behavior shall be specified.

**Table 52: Query/Retrieve C-MOVE Response Status Handling Behavior**

| Service Status | Further Meaning  | Error Code | Behavior   |
|----------------|--|------------|--|
| Success        | Sub-operations complete – No Failures                    | 0000       | The C-MOVE command has been completed.                           |
| Refused        | Out of Resources – Unable to calculate number of matches | A701       | N/A  |
|                | Out of Resources – Unable to perform Sub-operations      | A702       | N/A  |
|                | Move Destination unknown                                 | A801       | No C-STORE command will be sent. ViewForum R4.1 logs the reason. |
| Failed         | Identifier does not match SOP class                      | A900       | N/A  |

---

| Service Status | Further Meaning                                    | Error Code | Behavior  |
|----------------|--|------------|---|
|                | Unable to process                                  | C000       | The C-MOVE request cannot be parsed. No Store Command will be sent. ViewForum R4.1 logs the reason. |
| Cancel         | Sub-operations terminated due to Cancel Indication | FE00       | The C-MOVE request is canceled, no more C-MOVE responses are sent.                                  |
| Warning        | Sub-operations complete – One or more Failures     | B000       | N/A   |
| Pending        | Sub-operations are continuing                      | FF00       | Approximately every 30 seconds to indicate progress.  |

## 4.3 Network Interfaces

### 4.3.1 Physical Network Interface

The ViewForum R4.1 application provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of [DICOM].

ViewForum R4.1 inherits its TCP/IP stack from Windows XP (i.e. the operating system platform).

ViewForum R4.1 supports a single network interface: Ethernet ISO.8802-3. With standard supported physical medium include:

- IEEE 802.3 10BASE-TX
- IEEE 802.3 100BASE-TX (Fast Ethernet)
- IEEE 802.3 1000BASE-X (Fiber Optic Gigabit Ethernet).

## 4.4 Configuration

The ViewForum R4.1 system is configured by means of a configuration program. This program is accessible at start-up of the ViewForum R4.1 system. It is password protected and intended to be used by Philips Customer Support Engineers only.

The configuration program shall prompt the Customer Support Engineer to enter configuration information as required by the ViewForum R4.1 application.

### 4.4.1 AE Title/Presentation Address Mapping

An important installation issue is the translation from AE title to Presentation Address. How this is to be performed shall be described in this section.

#### 4.4.1.1 Local AE Titles

Per default the ViewForum AE title is equal to the IP host name. At installation the Customer Support Engineer can change this host name. The ViewForum AE can be changed independently.

**ViewForum R4.1** listens on **port 3010**. This port number is not configurable.

**Table 53: AE Title Configuration Table**

| Application Entity | Default AE Title | Default TCP/IP Port |
|--------------------|------------------|---------------------|
| ViewForum AE       | <IP host name>   | 3010 *              |

Note: \* Not configurable.

#### 4.4.1.2 Remote AE Title/Presentation Address Mapping

##### 4.4.1.2.1 Remote Association Initiators

All relevant remote applications able to setup a DICOM association towards ViewForum R4.1 must be configured at ViewForum R4.1 configuration time.

The Customer Support Engineer must provide the following information for each remote application:

- The Application Entity Title.
- The SOP classes and transfer syntaxes for which ViewForum R4.1 accepts associations.

#### 4.4.1.2.2 Remote Association Acceptors

The following information must be provided for all relevant remote applications that are able to accept DICOM associations from ViewForum R4.1:

- The Application Entity Title.
- The host name/IP address on which the remote application resides.
- The port number at which the remote application accepts association requests.

#### 4.4.2 Parameters

The specification of important operational parameters, and if configurable, their default value and range, shall be specified here.

The configuration parameters are given in Table 54, categorized in the following sections:

- General Parameters of ViewForum R4.1.
- Local Configurable Parameters of the ViewForum AE.
- Remote Configurable Parameters of the ViewForum AE.
- General Print Parameters.
- Printer Specific Print Parameters.

**Table 54: Configuration Parameters table**

| Parameter   | Configurable | Default Value |
|---|--------------|---------------|
| <b>General Parameters of ViewForum R4.1</b>   |              |               |
| Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout) | No           | -             |
| General DIMSE level time-out values   | No           | -             |
| Time-out waiting for response to TCP/IP connect request. (Low-level timeout)                                      | No           | -             |
| Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout)                         | No           | -             |
| Time-out for waiting for data between TCP/IP packets. (Low-level timeout)   | No           | -             |
| Any changes to default TCP/IP settings, such as configurable stack parameters.                                    | No           | -             |
| <b>Local Configurable Parameters of the ViewForum AE</b>  |              |               |
| Size constraint in maximum object size (see note)   | No           | -             |
| Maximum PDU size the AE can receive   | Yes          | 0 (unlimited) |
| Maximum PDU size the AE can send  | No           | -             |
| AE specific DIMSE level time-out values   | No           | -             |
| Number of simultaneous associations by Service and/or SOP class   | No           | -             |
| SOP class support   | Yes          | none          |
| Transfer Syntax support <sup>1</sup>  | Yes          | ELE           |

| Parameter   | Configurable | Default Value        |
|---|--------------|----------------------|
| <b>Remote Configurable Parameters of the ViewForum AE</b>   |              |                      |
| Size constraint in maximum object size (see note)   | No           | -                    |
| Maximum PDU size the AE can receive   | Yes          | 0 (unlimited)        |
| Maximum PDU size the AE can send  | No           | -                    |
| AE specific DIMSE level time-out values   | No           | -                    |
| Number of simultaneous associations by Service and/or SOP class   | No           | -                    |
| SOP class support   | Yes          | none                 |
| Transfer Syntax support   | Yes          | ELE                  |
| Storage Commitment request must be sent after Storage request   | Yes          | not                  |
| Storage Commitment time-out (synchronous to asynchronous)   | Yes          | none                 |
| Automatic conversion of images of SOP classes not supported by remote systems into Secondary Capture Image Storage SOP instances  | Yes          | convert to SC        |
| Export of pure DICOM images (i.e. only the standard DICOM attributes as defined in the related IOD) or extended DICOM images (with additional Standard DICOM, Private and Retired attributes) | Yes          | allow all attributes |
| Support of overlays for DICOM node not supporting Presentation State objects <sup>2</sup>   | Yes          | enabled              |
| Support of overlays for DICOM node supporting Presentation State objects <sup>2</sup>   | Yes          | disabled             |
| Support of overlays for CD <sup>2</sup>   | Yes          | disabled             |
| <b>General Print Parameters</b>   |              |                      |
| The DICOM printers that may be selected by the operator   | Yes          | none                 |
| <b>Printer Specific Print Parameters<sup>3</sup></b>  |              |                      |
| Medium type   | Yes          | all available        |
| Film size ID (i.e. Media size)  | Yes          | all available        |
| Resolution (300 / 600 dpi)  | Yes          | 300                  |
| Color model (8 / 16 bits color)   | Yes          | 8                    |
| Min Density   | Yes          | 0                    |
| Max Density   | Yes          | 0                    |

Note 1: The JPEG Baseline transfer syntax is only supported for RGB and YBR\_FULL\_422 images; therefore JPEG Baseline may NOT be configured for systems that are capable of handling storage of monochrome images too.

Note 2: The ViewForum R4.1 Copy-tool can override the configured setting of overlay support.

Note 3: These print parameters can be selected from choice lists. These choice lists are defined via so-called prototypes for each type of printer and print medium. These prototypes are also configurable.

## 5 MEDIA INTERCHANGE

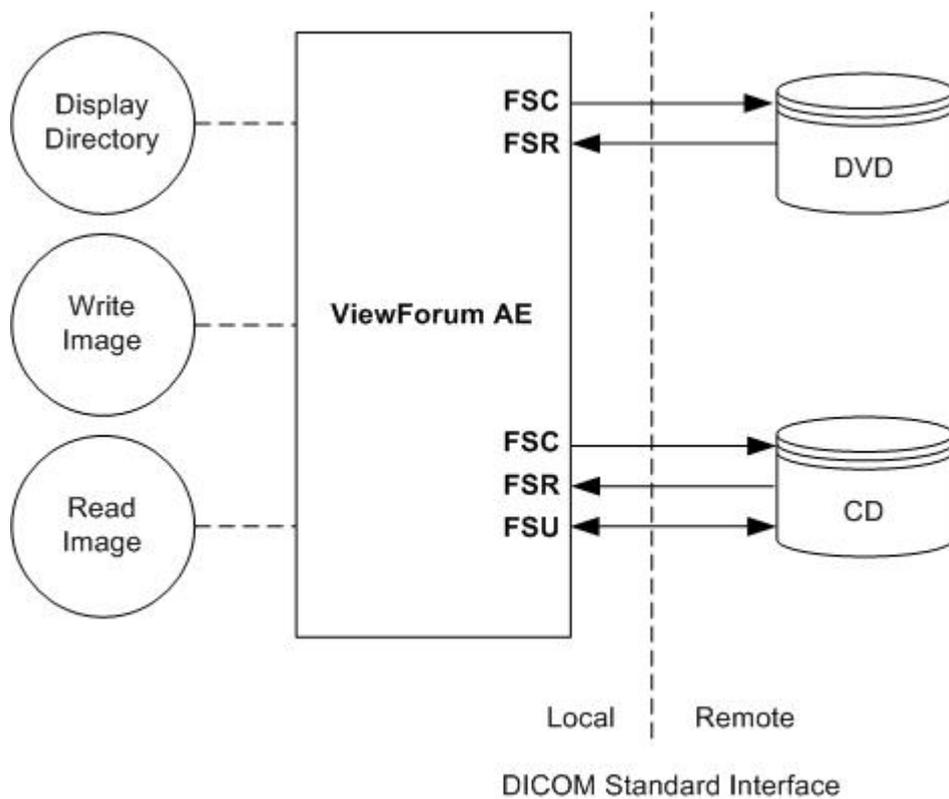
### 5.1 Implementation Model

The Implementation Model identifies the DICOM Application Entities in a specific implementation, and relates the Application Entities to Real-World Activities.

#### 5.1.1 Application Data Flow

The ViewForum R4.1 system consists of one single application entity only: the ViewForum R4.1 Application Entity (ViewForum AE).

Figure 16 shows the Media Interchange Application Data Flow as a functional overview of the ViewForum AE for CD-R and DVD.



**Figure 16: Media Interchange Application Data Flow Diagram**

Table 61 shows the Media Interchange overview of the ViewForum AE and the supporting roles for CD-R and DVD.

**Table 55: Media Services table**

| Media Storage Application | Write Files (FSC / FSU) | Read Files (FSR) |
|---------------------------|-------------------------|------------------|
| General Purpose CD-R      | YES / YES               | YES              |
| General Purpose DVD-JPEG  | YES / NO                | YES              |

The ViewForum AE will act as a FSR, for CD-R and DVD, when reading the directory of the medium. The ViewForum AE will act as a FSC / FSU for a CD-R and as FSC for DVD, when writing the selected images in a patient folder onto the medium. ViewForum supports the media profiles as shows in the Table below:

**Table 56: Media Profiles supported by ViewForum**

| Application Profile | CD         | DVD+RW / DVD+R |
|---------------------|------------|----------------|
| General Purpose     | STD-GEN-CD | STD-GEN-DVD    |

*Note; DVD-R and DVD-RW can be read but are not supported for writing.*

### Supported Photometric Interpretations

The ViewForum system supports images with the following DICOM Photometric Interpretations as shows in the Table below:

**Table 57: Photometric interpretations supported by ViewForum**

| Photometric Interpretation | Import | Export | Viewing |
|----------------------------|--------|--------|---------|
| MONOCHROME1                | YES    | YES    | YES     |
| MONOCHROME2                | YES    | YES    | YES     |
| PALETTE COLOR              | YES    | YES    | NO      |
| RGB                        | YES    | YES    | YES     |
| YBR_FULL                   | YES    | YES    | NO      |
| YBR_FULL_422 (see note)    | YES    | YES    | NO      |
| YBR_PARTIAL_422            | YES    | YES    | NO      |
| YBR_RCT                    | YES    | YES    | NO      |
| YBR_ICT                    | YES    | YES    | NO      |

*Note: if the photometric interpretation YBR\_FULL\_422 is used in combination with transfer syntax JPEG-lossy then the pixel data is converted to RGB on import.*

The system proposes the transfer syntaxes mentioned in Table below.

**Table 58: Transfer Syntaxes of DVD / CD supported by ViewForum**

| Abstract Syntax |          | Transfer Syntax   |   | Role | Extended Negotiation |
|-----------------|----------|-------------------|---|------|----------------------|
| Name            | UID      | Name List (note)  | UID List  |      |                      |
| See Note        | See Note | ILE<br>ELE<br>EBE | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.2 | SCU  | None                 |

*Note: any of the standard image storage and private SOP classes mentioned before. The preferred transfer syntax is ELE.*

ViewForum supports images with Lossy image compression via JPEG as described as shows in the Table below.

**Table 59: JPEG coding supported by ViewForum**

| DICOM Transfer Syntax UID | JPEG coding process | JPEG description                                  |
|---------------------------|---------------------|---|
| 1.2.840.10008.1.2.4.50    | 1                   | Lossy, Baseline<br>(JPEG 8 Bit Image Compression) |

*Note: Lossy Compression is only supported for images with photometric interpretation RGB and YBR\_FULL\_422 and therefore ViewForum supports this only for Ultrasound Images.*

## 5.1.2 Functional Definitions of AE's

This section shall describe in general terms the functions to be performed by the AE, and the DICOM services used to accomplish these functions.

### 5.1.2.1 Functional Definition of ViewForum AE

The ViewForum AE is the one and only application entity within ViewForum R4.1. It includes the following service class.

#### Media Storage Service Class for CD and DVD

The ViewForum AE can perform the CD-R Media Storage service as SCU, with capabilities for:

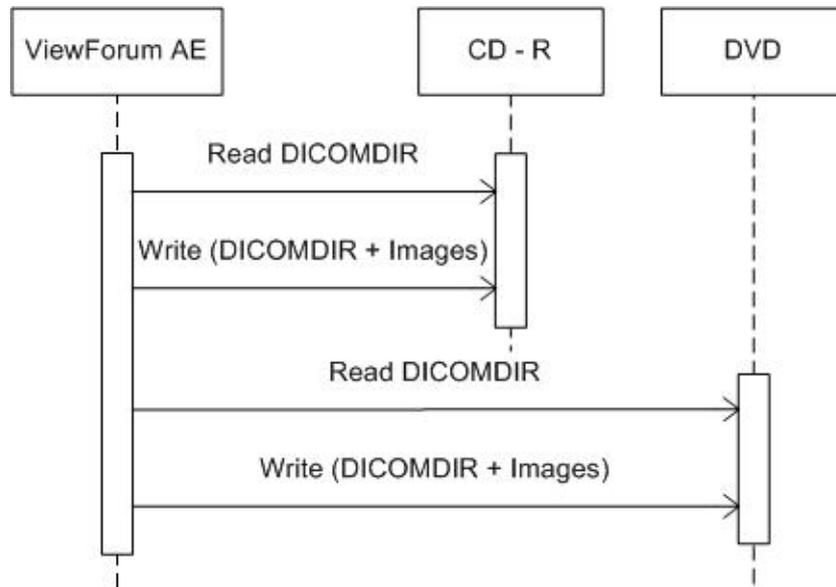
RWA Display Directory (as FSR),  
RWA Write Images (as FSC / FSU), and  
RWA Read Images (as FSR).

For DVD the ViewForum AE can perform the Media Storage service as SCU, with capabilities for:

RWA Display Directory (as FSR),  
RWA Write Images (as FSC), and  
RWA Read Images (as FSR).

## 5.1.3 Sequencing of Real World Activities

Whenever a CD or DVD has to be written the ViewForum AE first tries to read the DICOMDIR. The ViewForum AE will compile the updated DICOMDIR and any required DICOM images into a CD or DVD session image; this CD or DVD session image will be written to CD or DVD.



**Figure 17: Sequencing of RWA Write Images**

### 5.1.4 File Meta Information for Implementation Class and Version

This section shall be used to list the values assigned to the File Meta Information attributes (ref. [DICOM] PS 3.10) that pertain to the Implementation Class and Version.

The Implementation Class UID and the Implementation Version Name in the File Meta Header are as specified for Networking (ref. Table 9 in section 04.2.1.2.4).

**Table 60: DICOM Implementation Class and Version for ViewForum AE**

| Implementation Class and Version |                      |
|----------------------------------|----------------------|
| File Meta Information Version    | 00, 01               |
| Implementation Class UID         | 1.3.46.670589.5.2.23 |
| Implementation Version Name      | ViewForum R4.1       |

## 5.2 AE Specifications

The next section in the DICOM Conformance Statement contains the specification of the one and only ViewForum R4.1 Application Entity: ViewForum AE.

### 5.2.1 ViewForum AE

The ViewForum AE provides Standard Conformance to the DICOM Media Storage Service and File Format ([DICOM] PS 3.10), the Media Storage Application Profiles STD-GEN-CD ([DICOM] PS 3.11) and the Media Storage Application Profiles STD-GEN-DVD-JPEG ([DICOM] PS 3.12) for Reading and Writing.

ViewForum supports multi-patient and multi-session CD-R / DVD disks, both for Reading and Writing.

Supported media by ViewForum are:

**for CD:** CD R / CD RW with the profile: STD-GEN-CD and

**for DVD:** DVD+R and DVD+RW with the profile: STD-GEN-DVD-JPEG and the Transfer Syntax ELE uncompressed.

DVD-R and DVD-RW can be read but are not supported for writing.

The supported Application Profiles, their Roles and the Service Class (SC) options, all defined in DICOM terminology, are listed in Table 61.

**Table 61: AE Related Application Profiles, Real-World Activities, and Roles for CD-R and DVD**

| Supported Application Profile | Real-World Activity | Roles    | SC Option   |
|-------------------------------|---------------------|----------|-------------|
| STD-GEN-CD                    | Display Directory   | FSR      | Interchange |
|                               | Write Images        | FSC, FSU | Interchange |
|                               | Read Images         | FSR      | Interchange |
| STD-GEN-DVD-JPEG              | Display Directory   | FSR      | Interchange |
|                               | Write Images        | FSC      | Interchange |
|                               | Read Images         | FSR      | Interchange |

Only adding on instances is supported for the FSU, deleting is not supported.

#### 5.2.1.1 File Meta Information for the ViewForum AE

The Source Application Entity Title is configurable (see ref. section 5.4 Media Configuration).

#### 5.2.1.2 Real-World Activities

##### 5.2.1.2.1 Display Directory

When a database open action is initiated on the CD-R or DVD then the ViewForum AE acts as an FSR using the interchange option to read the DICOMDIR of the CD-R or DVD medium.

This will result in an overview of the patients, studies, series and images on the ViewForum R4.1 screen.

##### 5.2.1.2.1.1 Media Storage Application Profile

As depicted in Table 61, the ViewForum AE supports the RWA Display Directory for the STD-GEN-CD and the STD-GEN-DVD-JPEG Application Profile.

##### 5.2.1.2.1.1.1 Options

The mandatory DICOMDIR keys are required for the correct display of directory information. The display is structured according the DICOM Composite Information Model: Patient, Study, Serie and Image.

### 5.2.1.2.2 Write Images

When an image transfer to CD-R or DVD is initiated then the ViewForum AE acts as an FSC or FSU ( CD-R only ) using the interchange option to export SOP Instances from the local database to a CD-R or DVD medium.

#### 5.2.1.2.2.1 Media Storage Application Profile

As depicted in Table 61, the ViewForum AE supports the RWA Write Images for the STD-GEN-CD and the STD-GEN-DVD-JPEG Application Profile.

##### 5.2.1.2.2.1.1 Options

The same remarks as in section 4.2.1.3.1.3 about the existence of Optional, Retired and Private Attributes are applicable.

The DICOMDIR file will be extended when new images are written. In case some attributes are not present in an image but are specified as mandatory in the DICOMDIR definition in DICOM Media, a generated value will be filled in.

##### Implementation remarks and restrictions

When writing the DICOMDIR records, key values are generated when no value of the corresponding attribute is supplied, according to the following table.

**Table 62: Generated Keys**

| Key                 | Tag         | Generated Value  |
|---------------------|-------------|--|
| <b>Patient Keys</b> |             |  |
| Patient ID          | (0010,0020) | At import ViewForum R4.1 each time creates a new value based on the Study Instance UID for each new study written to the CD-R/ DVD (even if this study belongs to a patient recorded earlier). Otherwise the default-generated value shall be a succession of "UNKNOWN", the Patient's Name, the Patient's Birth Date, and the Patient's Sex, concatenated by using underscore characters. |
| <b>Study Keys</b>   |             |  |
| Study Date          | (0008,0020) | Current date   |
| Study Time          | (0008,0030) | Current time   |
| Study ID            | (0020,0010) | "UNKNOWN"  |
| <b>Series Keys</b>  |             |  |
| Series Number       | (0020,0011) | 1  |
| <b>Image Keys</b>   |             |  |
| Instance Number     | (0020,0013) | 1  |

The default value for the Pixel Intensity Relationship (0028,1040) is set to DISP.

ViewForum R4.1 can write volumes of the media to that media.

ViewForum asks for a new media if media is spanning over more CD-R / DVD disks.

### 5.2.1.2.3 Read Images

When an image transfer from CD-R or DVD is initiated then the ViewForum AE acts as an FSR using the interchange option to import SOP Instances from the CD-R / DVD medium.

---

#### **5.2.1.2.3.1 Media Storage Application Profile**

As depicted in Table 61, the ViewForum AE supports the RWA Read Images for the STD-GEN-CD and STD-GEN-DVD-JPEG Application Profile.

##### **5.2.1.2.3.1.1 Options**

The mandatory attributes of the DICOM images are required for the correct storage of the images in the ViewForum R4.1 internal image database.

Optional attributes and Retired/Private attributes are stored too – if present; this is equivalent with the level 2 (Full) conformance for the Storage service class in the Network support; ref. section 4.2.1.4.2.

The same remarks as in section 4.2.1.4.2.3 about the storage of images and about requirements to process read images via the dedicated ViewForum R4.1 application functions are applicable.

### **5.3 Augmented and Private Application Profiles**

This section shall be used for the description of Augmented and Private Application Profiles.

#### **5.3.1 Augmented Application Profiles**

None.

#### **5.3.2 Private Application Profiles**

None.

### **5.4 Media Configuration**

Any configuration issues may be found in the Networking section 4.4 Configuration.

---

## 6 SUPPORT OF CHARACTER SETS

ViewForum R4.1 supports the extended character set ISO 2022 IR 100, which is the Latin alphabet No 1, supplementary set.

When the ViewForum AE receives images with undefined character set then the import will be terminated with error status code.

ViewForum will accept images within Asian characters in the patient's name, however ViewForum will *not* display the patient's name properly.

---

## 7 SECURITY

### 7.1 Security Profiles

None supported.

### 7.2 Association level security

Any calling AE title and/or IP address may open an association.

### 7.3 Application level security

The ViewForum R4.1 supports the HIPAA Audit trail profile.

The ViewForum can create audit messages according to the IHE Basic Security Integration Profile [IHE] to audit activities, to detect non-compliant behavior in the enterprise, and to facilitate detection of improper creation, access, modification and deletion of Protected Health Information (PHI).

These messages may contain information that identifies the patient

## 8 ANNEXES

### 8.1 IOD Contents

#### 8.1.1 Created SOP Instances

This section specifies each IOD created by the ViewForum AE.

**Used abbreviations are:**

|          |  |
|----------|--|
| ALWAYS   | the module or attribute shall always be present with value                   |
| ANAP     | Attribute Not Always Present   |
| VNAP     | Value Not Always Present (attribute sent zero length if no value is present) |
| EMPTY    | Attribute is sent without a value  |
| MAYBE    | the module may be present under specified condition                          |
| OPTIONAL | the module may be available, depending on source object                      |
| AUTO     | the attribute value is generated automatically                               |
| CONF     | the attribute value source is a configurable parameter                       |
| IMPL     | the attribute value source is a user-implicit configuration setting          |
| SPEC     | the attribute value source is a specific DICOM object                        |
| USER     | the attribute value source is explicit user input                            |

##### 8.1.1.1 Secondary Capture Image Storage SOP Class

| Information Entity | Module Name              | Reference | Presence of Module |
|--------------------|--------------------------|-----------|--------------------|
| Patient            | Patient Module           | Table 63  | ALWAYS             |
| Study              | General Study Module     | Table 64  | ALWAYS             |
|                    | Patient Study Module     | Table 65  | OPTIONAL           |
| Series             | General Series Module    | Table 69  | ALWAYS             |
| Equipment          | General Equipment Module | Table 66  | OPTIONAL           |
|                    | SC Equipment Module      | Table 67  | ALWAYS             |
| Image              | General Image Module     | Table 71  | ALWAYS             |
|                    | Image Pixel Module       | Table 72  | ALWAYS             |
|                    | SC Image Module          | Table 70  | ALWAYS             |
|                    | Overlay Plane Module     | Table 75  | OPTIONAL           |
|                    | Modality LUT Module      | Table 68  | OPTIONAL           |
|                    | VOI LUT Module           | Table 68  | OPTIONAL           |
|                    | SOP Common Module        |           | ALWAYS             |
|                    |                          | Table 74  |                    |
| Private            | Private Module           |           | ANAP               |
|                    |                          | Table 77  |                    |

**Table 63: Patient Module**

| Attribute Name               | Tag       | VR | Value | Presence of Value | Source |
|------------------------------|-----------|----|-------|-------------------|--------|
| Patient's Name               | 0010,0010 | PN |       | VNAP              | AUTO   |
| Patient ID                   | 0010,0020 | LO |       | VNAP              | AUTO   |
| Patient's Birth Date         | 0010,0030 | DA |       | VNAP              | AUTO   |
| Patient's Sex                | 0010,0040 | CS |       | VNAP              | AUTO   |
| Referenced Patient Sequence  | 0008,1120 | SQ |       | ANAP              | AUTO   |
| >Referenced SOP Class UID    | 0008,1150 | UI |       | MAYBE             | AUTO   |
| >Referenced SOP Instance UID | 0008,1155 | UI |       | MAYBE             | AUTO   |
| Patient's Birth Time         | 0010,0032 | TM |       | ANAP              | AUTO   |
| Other Patient IDs            | 0010,1000 | LO |       | ANAP              | AUTO   |
| Other Patient Names          | 0010,1001 | PN |       | ANAP              | AUTO   |
| Ethnic Group                 | 0010,2160 | SH |       | ANAP              | AUTO   |
| Patient Comments             | 0010,4000 | LT |       | ANAP              | AUTO   |

**Table 64: General Study Module**

| Attribute Name                     | Tag       | VR | Value              | Presence of Value | Source |
|------------------------------------|-----------|----|--------------------|-------------------|--------|
| Study Instance UID                 | 0020,000D | UI |                    | ALWAYS            | AUTO   |
| Study Date                         | 0008,0020 | DA |                    | VNAP              | AUTO   |
| Study Time                         | 0008,0030 | TM |                    | VNAP              | AUTO   |
| Referring Physician's Name         | 0008,0090 | PN |                    | VNAP              | AUTO   |
| Study ID                           | 0020,0010 | SH |                    | VNAP              | AUTO   |
| Accession Number                   | 0008,0050 | SH |                    | VNAP              | AUTO   |
| Study Description                  | 0008,1030 | LO |                    | ANAP              | AUTO   |
| Physician(s) of Record             | 0008,1048 | PN |                    | ANAP              | AUTO   |
| Name of Physician(s) Reading Study | 0008,1060 | PN |                    | ANAP              | AUTO   |
| Referenced Study Sequence          | 0008,1110 | SQ |                    | ANAP              | AUTO   |
| >Referenced SOP Class UID          | 0008,1150 | UI |                    | MAYBE             | AUTO   |
| >Referenced SOP Instance UID       | 0008,1155 | UI |                    | MAYBE             | AUTO   |
| Procedure Code Sequence            | 0008,1032 | SQ |                    | ANAP              | AUTO   |
| >Code Sequence Macro               |           |    | Reference Table 76 |                   |        |

**Table 65: Patient Study Module**

| Attribute Name                    | Tag       | VR | Value              | Presence of Value | Source |
|-----------------------------------|-----------|----|--------------------|-------------------|--------|
| Admitting Diagnoses Description   | 0008,1080 | UI |                    | ANAP              | AUTO   |
| Admitting Diagnoses Code Sequence | 0008,1084 | SQ |                    | ANAP              | AUTO   |
| >Code Sequence Macro              |           |    | Reference Table 76 |                   |        |
| Patient's Age                     | 0010,1010 | AS |                    | ANAP              | AUTO   |
| Patient's Size                    | 0010,1020 | DS |                    | ANAP              | AUTO   |
| Patient's Weight                  | 0010,1030 | DS |                    | ANAP              | AUTO   |
| Occupation                        | 0010,2180 | SH |                    | ANAP              | AUTO   |
| Additional Patient's History      | 0010,21B0 | LT |                    | ANAP              | AUTO   |

**Table 66: General Equipment Module**

| Attribute Name                | Tag       | VR        | Value | Presence of Value | Source |
|-------------------------------|-----------|-----------|-------|-------------------|--------|
| Manufacturer                  | 0008,0070 | LO        |       | VNAP              | AUTO   |
| Institution Name              | 0008,0080 | LO        |       | ANAP              | AUTO   |
| Institution Address           | 0008,0081 | ST        |       | ANAP              | AUTO   |
| Station Name                  | 0008,1010 | SH        |       | ANAP              | AUTO   |
| Institutional Department Name | 0008,1040 | LO        |       | ANAP              | AUTO   |
| Manufacturer's Module Name    | 0008,1090 | LO        |       | ANAP              | AUTO   |
| Device Serial Number          | 0018,1000 | LO        |       | ANAP              | AUTO   |
| Software Versions             | 0018,1020 | LO        |       | ANAP              | AUTO   |
| Spatial Resolution            | 0018,1050 | DS        |       | ANAP              | AUTO   |
| Date of Last Calibration      | 0018,1200 | DA        |       | ANAP              | AUTO   |
| Time of Last Calibration      | 0018,1201 | TM        |       | ANAP              | AUTO   |
| Pixel Padding Value           | 0028,0120 | US/<br>SS |       | ANAP              | AUTO   |

**Table 67: SC Equipment Module**

| Attribute Name  | Tag       | VR | Value | Presence of Value | Source |
|-----------------|-----------|----|-------|-------------------|--------|
| Modality        | 0008,0060 | CS |       | ALWAYS            | AUTO   |
| Conversion Type | 0008,0064 | CS | WSD   | ALWAYS            | AUTO   |

**Table 68: Modality LUT Module**

| Attribute Name        | Tag       | VR               | Value | Presence of Value | Source |
|-----------------------|-----------|------------------|-------|-------------------|--------|
| Modality LUT Sequence | 0028,3000 | SQ               |       | MAYBE             | AUTO   |
| >LUT Descriptor       | 0028,3002 | US/<br>SS        |       | MAYBE             | AUTO   |
| >LUT Explanation      | 0028,3003 | LO               |       | ANAP              | AUTO   |
| >Modality LUT Type    | 0028,3004 | LO               |       | MAYBE             | AUTO   |
| >LUT Data             | 0028,3006 | US/<br>SS/<br>OW |       | MAYBE             | AUTO   |
| Rescale Intercept     | 0028,1052 | DS               |       | MAYBE             | AUTO   |
| Rescale Slope         | 0028,1053 | DS               |       | MAYBE             | AUTO   |

**Table 69: General Series Module**

| Attribute Name                               | Tag       | VR    | Value              | Presence of Value | Source |
|--|-----------|-------|--------------------|-------------------|--------|
| Series Instance UID                          | 0020,000E | UI    |                    | ALWAYS            | CONF   |
| Series Number                                | 0020,0011 | IS    |                    | VNAP              | AUTO   |
| Laterality                                   | 0020,0060 | CS    |                    | MAYBE             | AUTO   |
| Series Date                                  | 0008,0021 | DA    |                    | ANAP              | AUTO   |
| Series Time                                  | 0008,0031 | TM    |                    | ANAP              | AUTO   |
| Performing Physicians' Name                  | 0008,1050 | PN    |                    | ANAP              | AUTO   |
| Protocol Name                                | 0018,1030 | LO    |                    | ANAP              | AUTO   |
| Series Description                           | 0008,103E | LO    |                    | ANAP              | AUTO   |
| Operators' Name                              | 0008,1070 | PN    |                    | ANAP              | AUTO   |
| Referenced Performed Procedure Step_Sequence | 0008,1111 | SQ    |                    | ANAP              | AUTO   |
| >Referenced SOP Class UID                    | 0008,1150 | UI    |                    | MAYBE             | AUTO   |
| >Referenced SOP Instance UID                 | 0008,1155 | UI    |                    | MAYBE             | AUTO   |
| Body Part Examined                           | 0018,0015 | CS    |                    | ANAP              | AUTO   |
| Patient Position                             | 0018,5100 | CS    |                    | MAYBE             | AUTO   |
| Smallest Pixel Value in Series               | 0028,0108 | US/SS |                    | ANAP              | AUTO   |
| Largest Pixel Value in Series                | 0028,0109 | US/SS |                    | ANAP              | AUTO   |
| Request Attributes Sequence                  | 0040,0275 | SQ    |                    | ANAP              | AUTO   |
| >Requested Procedure ID                      | 0040,1001 | SH    |                    | MAYBE             | AUTO   |
| >Scheduled Procedure Step ID                 | 0040,0009 | SH    |                    | MAYBE             | AUTO   |
| >Scheduled Procedure Step Description        | 0040,0007 | LO    |                    | ANAP              | AUTO   |
| >Scheduled Protocol Code Sequence            | 0040,0008 | SQ    |                    | ANAP              | AUTO   |
| >>Code Sequence Code Sequence                |           |       | Reference Table 76 |                   |        |
| Performed Procedure Step ID                  | 0040,0253 | SH    |                    | ANAP              | AUTO   |
| Performed Procedure Step Start Date          | 0040,0244 | DA    |                    | ANAP              | AUTO   |
| Performed Procedure Step Start Time          | 0040,0245 | TM    |                    | ANAP              | AUTO   |
| Performed Procedure Step Description         | 0040,0254 | LO    |                    | ANAP              | AUTO   |
| Performed Protocol Code Sequence             | 0040,0260 | SQ    |                    | ANAP              | AUTO   |
| >Code Sequence Macro                         |           |       | Reference Table 76 |                   |        |
| Comments on the Performed Procedure Step     | 0040,0280 | ST    |                    | ANAP              | AUTO   |

**Table 70: SC Image Module Module**

| Attribute Name            | Tag       | VR | Value | Presence of Value | Source |
|---------------------------|-----------|----|-------|-------------------|--------|
| Date of Secondary Capture | 0018,1012 | DA |       | ALWAYS            | AUTO   |
| Time of Secondary Capture | 0018,1014 | TM |       | ALWAYS            | AUTO   |

**Table 71: General Image Module**

| Attribute Name  | Tag       | VR | Value | Presence of Value | Source |
|-----------------|-----------|----|-------|-------------------|--------|
| Instance Number | 0020,0013 | IS |       | VNAP              | AUTO   |

|                                     |           |    |                    |        |      |
|-------------------------------------|-----------|----|--------------------|--------|------|
| Patient Orientation                 | 0020,0020 | CS |                    | ALWAYS | AUTO |
| Content Date                        | 0008,0023 | DA |                    | MAYBE  | AUTO |
| Content Time                        | 0008,0033 | TM |                    | MAYBE  | AUTO |
| Image Type                          | 0008,0008 | CS |                    | ANAP   | AUTO |
| Acquisition Number                  | 0020,0012 | IS |                    | ANAP   | AUTO |
| Acquisition Date                    | 0008,0022 | DA |                    | ANAP   | AUTO |
| Acquisition Time                    | 0008,0032 | TM |                    | ANAP   | AUTO |
| Acquisition Datetime                | 0008,002A | DT |                    | ANAP   | AUTO |
| Referenced Image Sequence           | 0008,1140 | SQ |                    | ANAP   | AUTO |
| >Referenced SOP Class UID           | 0008,1150 | UI |                    | MAYBE  | AUTO |
| >Referenced SOP Instance UID        | 0008,1155 | UI |                    | MAYBE  | AUTO |
| >Referenced Frame Number            | 0008,1160 | IS |                    | ANAP   | AUTO |
| >Purpose of Reference Code Sequence | 0040,A170 | SQ |                    | ANAP   | AUTO |
| >>Code Sequence Macro               |           |    | Reference Table 76 |        |      |
| Derivation Description              | 0008,2111 | ST |                    | ANAP   | AUTO |
| Derivation Code Sequence            | 0008,9215 | SQ |                    | ANAP   | AUTO |
| >>Code Sequence Macro               |           |    | Reference Table 76 |        |      |
| Source Image Sequence               | 0008,2112 | SQ |                    | ANAP   | AUTO |
| >Referenced SOP Class UID           | 0008,1150 | UI |                    | MAYBE  | AUTO |
| >Referenced SOP Instance UID        | 0008,1155 | UI |                    | MAYBE  | AUTO |
| >Referenced Frame Number            | 0008,1160 | IS |                    | ANAP   | AUTO |
| >Purpose of Reference Code Sequence | 0040,A170 | SQ |                    | ANAP   | AUTO |
| >>Code Sequence Macro               |           |    | Reference Table 76 |        |      |
| >Purpose of Reference Code Sequence | 0040,A170 | SQ |                    | ALWAYS | AUTO |
| >>Code Sequence Marco               |           |    | Reference Table 76 |        |      |
| Images in Acquisition               | 0020,1002 | IS |                    | ANAP   | AUTO |
| Image Comments                      | 0020,4000 | LT |                    | ANAP   | AUTO |
| Quality Control Image               | 0028,0300 | CS |                    | ANAP   | AUTO |
| Burned in Annotation                | 0028,0301 | CS |                    | ANAP   | AUTO |
| Lossy Image Compression             | 0028,2110 | CS |                    | ANAP   | AUTO |
| Lossy Image Compression Ratio       | 0028,2112 | DS |                    | ANAP   | AUTO |
| Icon Image Sequence                 | 0088,0200 | SQ |                    | ANAP   | AUTO |
| >Pixel Spacing                      | 0028,0030 | DS |                    | ALWAYS | AUTO |
| >Slice Thickness                    | 0018,0050 | DS |                    | ALWAYS | AUTO |
| >Slice Location                     | 0020,1041 | DS |                    | ALWAYS | AUTO |
| Presentation LUT Shape              | 2050,0020 | CS |                    | ANAP   | AUTO |

Table 72: Image Pixel Module

| Attribute Name             | Tag       | VR | Value | Presence of Value | Source |
|----------------------------|-----------|----|-------|-------------------|--------|
| Samples per Pixel          | 0028,0002 | US |       | ALWAYS            | AUTO   |
| Photometric Interpretation | 0028,0004 | CS |       | ALWAYS            | AUTO   |
| Row                        | 0028,0010 | US |       | ALWAYS            | AUTO   |
| Columns                    | 0028,0011 | US |       | ALWAYS            | AUTO   |

|  |           |           |  |        |      |
|--|-----------|-----------|--|--------|------|
| Bits Allocated                                 | 0028,0100 | US        |  | ALWAYS | AUTO |
| Bits Stored                                    | 0028,0101 | US        |  | ALWAYS | AUTO |
| High Bit                                       | 0028,0102 | US        |  | ALWAYS | AUTO |
| Pixel Representation                           | 0028,0103 | US        |  | ALWAYS | AUTO |
| Pixel Data                                     | 7FE0,0010 | OW        |  | ALWAYS | AUTO |
| Planar Configuration                           | 0028,0006 | US        |  | MAYBE  | AUTO |
| Pixel Aspect Ratio                             | 0028,0034 | IS        |  | MAYBE  | AUTO |
| Smallest Image Pixel Value                     | 0028,0106 | US/<br>SS |  | ANAP   | AUTO |
| Largest Image Pixel Value                      | 0028,0107 | US/<br>SS |  | ANAP   | AUTO |
| Red Palette Color Lookup Table<br>Descriptor   | 0028,1101 | US/<br>SS |  | MAYBE  | AUTO |
| Green Palette Color Lookup Table<br>Descriptor | 0028,1102 | US/<br>SS |  | MAYBE  | AUTO |
| Blue Palette Color Lookup Table<br>Descriptor  | 0028,1103 | US/<br>SS |  | MAYBE  | AUTO |
| Red Palette Color Lookup Table Data            | 0028,1201 | OW        |  | MAYBE  | AUTO |
| Green Palette Color Lookup Table<br>Data       | 0028,1202 | OW        |  | MAYBE  | AUTO |
| Blue Palette Color Lookup Table<br>Data        | 0028,1203 | OW        |  | MAYBE  | AUTO |

**Table 73: VOI LUT Module**

| Attribute Name                    | Tag       | VR               | Value | Presence<br>of Value | Source |
|-----------------------------------|-----------|------------------|-------|----------------------|--------|
| VOI LUT Sequence                  | 0028,3010 | SQ               |       | ANAP                 | AUTO   |
| >LUT Descriptor                   | 0028,3002 | US/<br>SS        |       | MAYBE                | AUTO   |
| >LUT Explanation                  | 0028,3003 | LO               |       | ANAP                 | AUTO   |
| >LUT Data                         | 0028,3006 | US/<br>SS/<br>OW |       | MAYBE                | AUTO   |
| Window Center                     | 0028,1050 | DS               |       | ANAP                 | AUTO   |
| Window Width                      | 0028,1051 | DS               |       | MAYBE                | AUTO   |
| Window Center & Width Explanation | 0028,1055 | LO               |       | ANAP                 | AUTO   |

**Table 74: SOP Common Module**

| Attribute Name   | Tag       | VR | Value                 | Presence<br>of Value | Source |
|------------------|-----------|----|-----------------------|----------------------|--------|
| SOP Class UID    | 0008,0016 | UI | 1.2.840.10008.5.1.1.7 | ALWAYS               | AUTO   |
| SOP Instance UID | 0008,0018 | UI |                       | ALWAYS               | AUTO   |

**Table 75: Overlay Plane Module**

| Attribute Name  | Tag       | VR | Value | Presence<br>of Value | Source |
|-----------------|-----------|----|-------|----------------------|--------|
| Overlay Rows    | 60xx,0010 | US |       | ALWAYS               | AUTO   |
| Overlay Columns | 60xx,0011 | US |       | ALWAYS               | AUTO   |
| Overlay Type    | 60xx,0040 | CS |       | ALWAYS               | AUTO   |
| Overlay Origin  | 60xx,0050 | SS |       | ALWAYS               | AUTO   |

|                        |           |           |  |        |      |
|------------------------|-----------|-----------|--|--------|------|
| Overlay Bits Allocated | 60xx,0100 | US        |  | ALWAYS | AUTO |
| Overlay Bits Position  | 60xx,0102 | US        |  | ALWAYS | AUTO |
| Overlay Data           | 60xx,3000 | OW/<br>OB |  | MAYBE  | AUTO |
| Overlay Description    | 60xx,0022 | LO        |  | ANAP   | AUTO |
| Overlay Subtype        | 60xx,0045 | LO        |  | ANAP   | AUTO |
| Overlay Label          | 60xx,1500 | LO        |  | ANAP   | AUTO |
| ROI Area               | 60xx,1301 | IS        |  | ANAP   | AUTO |
| ROI Mean               | 60xx,1302 | DS        |  | ANAP   | AUTO |
| ROI Standard Deviation | 60xx,1303 | DS        |  | ANAP   | AUTO |

**Table 76: Code Sequence Macro**

| Attribute Name                      | Tag       | VR | Value | Presence of Value | Source |
|-------------------------------------|-----------|----|-------|-------------------|--------|
| <b>Basic Coded Entry Attributes</b> |           |    |       |                   |        |
| Code Value                          | 0008,0100 | SH |       | MAYBE             | AUTO   |
| Coding Scheme Designator            | 0008,0102 | SH |       | MAYBE             | AUTO   |
| Coding Scheme Version               | 0008,0103 | SH |       | MAYBE             | AUTO   |
| Code Meaning                        | 0008,0104 | LO |       | MAYBE             | AUTO   |
| <b>Enhanced Encoding Mode</b>       |           |    |       |                   |        |
| Context Identifier                  | 0008,010F | CS |       | ANAP              | AUTO   |
| Mapping Resource                    | 0008,0105 | CS |       | MAYBE             | AUTO   |
| Context Group Version               | 0008,0106 | DT |       | MAYBE             | AUTO   |
| Context Group Extension Flag        | 0008,010B | CS |       | ANAP              | AUTO   |
| Context Group Local Version         | 0008,0107 | DT |       | MAYBE             | AUTO   |
| Context Group Extension Creator UID | 0008,010D | UI |       | MAYBE             | AUTO   |

**Table 77: Private Module**

| Attribute Name | Tag       | VR | Value | Presence of Value | Source |
|----------------|-----------|----|-------|-------------------|--------|
|                | 2001,00FF | LO |       | ANAP              | AUTO   |
|                | 2001,FF6E | SH |       | ANAP              | AUTO   |
|                | 2007,00FE | LO |       | ANAP              | AUTO   |
|                | 2007,FE12 | LO |       | ANAP              | AUTO   |

### 8.1.1.2 Grayscale Softcopy Presentation State Storage SOP Class

When the ViewForum AE imports a storage object without presentation state object then it will create a presentation object for this storage object, which it then can use for export (if negotiated).

If private presentation state information exists, then this will be used to create the presentation state object. Depending on the setup, the ViewForum AE may or may not add this private presentation state information on export.

**Table 78: Modules of the Grayscale Softcopy Presentation State Storage SOP Class**

| Information Entity | Module Name                      | Reference | Presence of Module |
|--------------------|----------------------------------|-----------|--------------------|
| Patient            | Patient Module                   | Table 79  | ALWAYS             |
| Study              | General Study Module             | Table 80  | ALWAYS             |
| Series             | General Series Module            | Table 81  | ALWAYS             |
|                    | Presentation Series Module       | Table 82  | ALWAYS             |
| Equipment          | General Equipment Module         | Table 84  | ALWAYS             |
| Modality LUT       | Modality LUT Module              | Table 83  | MAYBE              |
| Image              | Mask module                      | Table 85  | MAYBE              |
|                    | Display shutter module           | Table 86  | MAYBE              |
|                    | Overlay Plane Module             | Table 87  | MAYBE              |
|                    | Displayed Area Module            | Table 88  | ALWAYS             |
|                    | Graphic Layer Module             | Table 89  | MAYBE              |
|                    | Softcopy Presentation LUT Module | Table 90  | ALWAYS             |
|                    | Overlay/Curve Activation Module  | Table 91  | MAYBE              |
|                    | Softcopy VOI LUT Module          | Table 92  | MAYBE              |
|                    | Presentation State Module        | Table 93  | ALWAYS             |
|                    | SOP Common Module                | Table 94  | ALWAYS             |

**Table 79: Patient Module**

| Attribute Name       | Tag       | VR | Value   | Presence of Value | Source |
|----------------------|-----------|----|---------|-------------------|--------|
| Patient's Name       | 0010,0010 | PN |         | VNAP              | SPEC   |
| Patient ID           | 0010,0020 | LO |         | VNAP              | SPEC   |
| Patient's Birth Date | 0010,0030 | DA |         | VNAP              | SPEC   |
| Patient's Sex        | 0010,0040 | CS | F, M, O | VNAP              | SPEC   |

**Table 80: General Study Module**

| Attribute Name             | Tag       | VR | Value | Presence of Value | Source |
|----------------------------|-----------|----|-------|-------------------|--------|
| Study Instance UID         | 0020,000D | UI |       | ALWAYS            | SPEC   |
| Study Date                 | 0008,0020 | DA |       | VNAP              | SPEC   |
| Study Time                 | 0008,0030 | TM |       | VNAP              | SPEC   |
| Referring Physician's Name | 0008,0090 | PN |       | VNAP              | SPEC   |
| Study ID                   | 0020,0010 | SH |       | VNAP              | SPEC   |
| Accession Number           | 0008,0050 | SH |       | VNAP              | SPEC   |
| Study Description          | 0008,1030 | LO |       | ANAP              | SPEC   |

**Table 81: General Series Module**

| Attribute Name      | Tag       | VR | Value | Presence of Value | Source |
|---------------------|-----------|----|-------|-------------------|--------|
| Series Instance UID | 0020,000E | UI |       | ALWAYS            | AUTO   |
| Series Number       | 0020,0011 | IS |       | VNAP              | SPEC   |
| Series Date         | 0008,0021 | DA |       | ANAP              | SPEC   |
| Series Time         | 0008,0031 | TM |       | ANAP              | SPEC   |
| Laterally           | 0020,0060 | CS | L, R  | MAYBE             | SPEC   |

**Table 82: Presentation Series Module**

| Attribute Name | Tag       | VR | Value | Presence of Value | Source |
|----------------|-----------|----|-------|-------------------|--------|
| Modality       | 0008,0060 | CS | PR    | ALWAYS            | AUTO   |

**Table 83: Modality LUT Module**

| Attribute Name        | Tag       | VR               | Value | Presence of Value | Source |
|-----------------------|-----------|------------------|-------|-------------------|--------|
| Modality LUT Sequence | 0028,3000 | SQ               |       | MAYBE             | SPEC   |
| >LUT Descriptor       | 0028,3002 | US/<br>SS        |       | MAYBE             | SPEC   |
| >LUT Explanation      | 0028,3003 | LO               |       | ANAP              | SPEC   |
| >Modality LUT Type    | 0028,3004 | LO               |       | MAYBE             | SPEC   |
| >LUT Data             | 0028,3006 | US/<br>SS/<br>OW |       | MAYBE             | SPEC   |
| Rescale Intercept     | 0028,1052 | DS               |       | MAYBE             | SPEC   |
| Rescale Slope         | 0028,1053 | DS               |       | MAYBE             | SPEC   |
| Rescale Type          | 0028,1054 | LO               |       | MAYBE             | SPEC   |

**Table 84: General Equipment Module**

| Attribute Name            | Tag       | VR | Value | Presence of Value | Source |
|---------------------------|-----------|----|-------|-------------------|--------|
| Manufacturer              | 0008,0070 | LO |       | ALWAYS            | AUTO   |
| Manufacturer's Model Name | 0008,1090 | LO |       | ALWAYS            | AUTO   |
| Software Versions         | 0018,1020 | LO |       | ALWAYS            | AUTO   |

**Table 85: Mask Module**

| Attribute Name              | Tag       | VR | Value              | Presence of Value | Source |
|-----------------------------|-----------|----|--------------------|-------------------|--------|
| Recommended Viewing Mode    | 0028,1090 | CS | NAT, SUB           | VNAP              | SPEC   |
| Mask Subtraction Sequence   | 0028,6100 | SQ |                    | ALWAYS            | SPEC   |
| >Mask Operation             | 0028,6101 | CS | AVG_SUB, NONE, TID | ALWAYS            | SPEC   |
| >Applicable Frame Range     | 0028,6102 | US |                    | ANAP              | SPEC   |
| >Mask Frame Numbers         | 0028,6110 | US |                    | MAYBE             | SPEC   |
| >Contrast Frame Averaging   | 0028,6112 | US |                    | ANAP              | SPEC   |
| >Mask Sub-pixel Shift       | 0028,6114 | FL |                    | ANAP              | SPEC   |
| >TID Offset                 | 0028,6120 | SS |                    | MAYBE             | SPEC   |
| >Mask Operation Explanation | 0028,6190 | ST |                    | ANAP              | SPEC   |

**Table 86: DISPLAY Shutter Module**

| Attribute Name                    | Tag       | VR | Value                            | Presence of Value | Source |
|-----------------------------------|-----------|----|----------------------------------|-------------------|--------|
| Shutter Shape                     | 0018,1600 | CS | CIRCULAR, POLYGONAL, RECTANGULAR | ALWAYS            | SPEC   |
| Shutter Left Vertical Edge        | 0018,1602 | IS |                                  | MAYBE             | SPEC   |
| Shutter Right Vertical Edge       | 0018,1604 | IS |                                  | MAYBE             | SPEC   |
| Shutter Upper Horizontal Edge     | 0018,1606 | IS |                                  | MAYBE             | SPEC   |
| Shutter Lower Horizontal Edge     | 0018,1608 | IS |                                  | MAYBE             | SPEC   |
| Center of Circular Shutter        | 0018,1610 | IS |                                  | MAYBE             | SPEC   |
| Radius of Circular Shutter        | 0018,1612 | IS |                                  | MAYBE             | SPEC   |
| Vertices of the Polygonal Shutter | 0018,1620 | IS |                                  | MAYBE             | SPEC   |

**Table 87: Overlay Plane Module**

| Attribute Name         | Tag       | VR    | Value | Presence of Value | Source |
|------------------------|-----------|-------|-------|-------------------|--------|
| Overlay Rows           | 60xx,0010 | US    |       | ALWAYS            | SPEC   |
| Overlay Columns        | 60xx,0011 | US    |       | ALWAYS            | SPEC   |
| Overlay Description    | 60xx,0022 | LO    |       | ALWAYS            | SPEC   |
| Overlay Type           | 60xx,0040 | CS    | G, R  | ALWAYS            | SPEC   |
| Overlay Subtype        | 60xx,0045 | LO    |       | ANAP              | SPEC   |
| Overlay Origin         | 60xx,0050 | SS    | 1/1   | ALWAYS            | SPEC   |
| Overlay Bits Allocated | 60xx,0100 | US    | 1     | ALWAYS            | SPEC   |
| Overlay Bit Position   | 60xx,0102 | US    | 0     | ALWAYS            | SPEC   |
| ROI Area               | 60xx,1301 | IS    |       | ANAP              | SPEC   |
| ROI Mean               | 60xx,1302 | DS    |       | ANAP              | SPEC   |
| ROI Standard Deviation | 60xx,1303 | DS    |       | ANAP              | SPEC   |
| Overlay Label          | 60xx,1500 | LO    |       | ANAP              | SPEC   |
| Overlay Data           | 60xx,3000 | OB/OW |       | MAYBE             | SPEC   |

**Table 88: Displayed Area Module**

| Attribute Name                           | Tag       | VR | Value        | Presence of Value | Source |
|--|-----------|----|--------------|-------------------|--------|
| Displayed Area Selection Sequence        | 0070,005A | SQ |              | ALWAYS            | AUTO   |
| >Displayed Area Top Left Hand Corner     | 0070,0052 | SL | 1/1          | ALWAYS            | AUTO   |
| >Displayed Area Bottom Right Hand Corner | 0070,0053 | SL |              | ALWAYS            | AUTO   |
| >Presentation Size Mode                  | 0070,0100 | CS | SCALE TO FIT | ALWAYS            | AUTO   |
| Private Creator                          | 2001,0010 | LO |              | ALWAYS            | AUTO   |
| Interpolation Method                     | 2001,103F | CS |              | ALWAYS            | AUTO   |

**Table 89: Graphic Layer Module**

| Attribute Name         | Tag       | VR | Value                   | Presence of Value | Source |
|------------------------|-----------|----|-------------------------|-------------------|--------|
| Graphic Layer Sequence | 0070,0060 | SQ |                         | ALWAYS            | AUTO   |
| >Graphic Layer         | 0070,0002 | CS | Layer created on import | ALWAYS            | AUTO   |
| >Graphic Layer         | 0070,0062 | IS | 1                       | ALWAYS            | AUTO   |

**Table 90: Softcopy Presentation LUT Module**

| Attribute Name            | Tag       | VR | Value | Presence of Value | Source |
|---------------------------|-----------|----|-------|-------------------|--------|
| Presentation LUT Sequence | 2050,0010 | SQ |       | ALWAYS            | AUTO   |
| >LUT Descriptor           | 0028,3002 | SS |       | ALWAYS            | AUTO   |
| >LUT Data                 | 0028,3006 | OW |       | ALWAYS            | AUTO   |

**Table 91: Overlays/Curve Activation Module**

| Attribute Name           | Tag       | VR | Value                   | Presence of Value | Source |
|--------------------------|-----------|----|-------------------------|-------------------|--------|
| Curve Activation Layer   | 50xx,1001 | CS | Layer created on import | MAYBE             | AUTO   |
| Overlay Activation Layer | 60xx,1001 | CS | Layer created on import | MAYBE             | AUTO   |

**Table 92: Softcopy VOI LUT Module**

| Attribute Name                     | Tag       | VR               | Value | Presence of Value | Source |
|------------------------------------|-----------|------------------|-------|-------------------|--------|
| Softcopy VOI LUT Sequence          | 0028,3110 | SQ               |       | ALWAYS            | SPEC   |
| >Referenced Image Sequence         | 0008,1140 | SQ               |       | MAYBE             | SPEC   |
| >>Referenced SOP Class UID         | 0008,1150 | UI               |       | MAYBE             | SPEC   |
| >>Referenced SOP Instance UID      | 0008,1155 | UI               |       | MAYBE             | SPEC   |
| >>Referenced Frame Number          | 0008,1160 | IS               |       | MAYBE             | SPEC   |
| >Window Center                     | 0028,1050 | DS               |       | MAYBE             | SPEC   |
| >Window Width                      | 0018,1051 | DS               |       | MAYBE             | SPEC   |
| >Window Center & Width Explanation | 0028,1055 | LO               |       | ANAP              | SPEC   |
| >VOI LUT Sequence                  | 0028,3010 | SQ               |       | MAYBE             | SPEC   |
| >>LUT Descriptor                   | 0028,3002 | SS/<br>US        |       | MAYBE             | SPEC   |
| >>LUT Explanation                  | 0028,3003 | LO               |       | ANAP              | SPEC   |
| >>LUT Data                         | 0028,3006 | OW/<br>SS/<br>US |       | MAYBE             | SPEC   |

**Table 93: Presentation State Module**

| Attribute Name                | Tag       | VR | Value         | Presence of Value | Source |
|-------------------------------|-----------|----|---------------|-------------------|--------|
| Referenced Series Sequence    | 0008,1115 | SQ |               | ALWAYS            | AUTO   |
| >Referenced Image Sequence    | 0008,1140 | SQ |               | MAYBE             | AUTO   |
| >>Referenced SOP Class UID    | 0008,1150 | UI |               | MAYBE             | AUTO   |
| >>Referenced SOP Instance UID | 0008,1155 | UI |               | MAYBE             | AUTO   |
| >Series Instance UID          | 0020,000E | UI |               | MAYBE             | AUTO   |
| Shutter Presentation Value    | 0018,1622 | US | 0             | MAYBE             | AUTO   |
| Instance Number               | 0020,0013 | IS | 1             | ALWAYS            | AUTO   |
| Presentation Label            | 0070,0080 | CS | NEW AT IMPORT | ALWAYS            | AUTO   |
| Presentation Description      | 0070,0081 | LO |               | VNAP              | AUTO   |
| Presentation Creation Date    | 0070,0082 | DA | Current date  | ALWAYS            | AUTO   |
| Presentation Creation Time    | 0070,0083 | TM | Current time  | ALWAYS            | AUTO   |
| Presentation Creator's Name   | 0070,0084 | PN |               | VNAP              | AUTO   |

**Table 94: SOP Common Module**

| Attribute Name   | Tag       | VR | Value                  | Presence of Value | Source |
|------------------|-----------|----|------------------------|-------------------|--------|
| SOP Class UID    | 0008,0016 | UI | 1.2.840.10008.5.1.1.23 | ALWAYS            | AUTO   |
| SOP Instance UID | 0008,0018 | UI |                        | ALWAYS            | AUTO   |

### 8.1.2 Attribute Mapping

Not applicable.

### 8.1.3 Coerced/Modified fields

In general, ViewForum R4.1 will try and optimize the imported image data. This may involve the removal of redundant data, either or not due to the creation of a Presentation State object for the image data. This may also involve the creation of extra attributes. As it is not the intention of ViewForum R4.1 to export this data as such, the SOP Instance UID shall not be changed.

If not available at import then ViewForum R4.1 will create the additional attributes as listed in 95.

**Table 95: Additional Attributes for Import Images**

| Name                                 | Tag       | Generated Value                            |
|--------------------------------------|-----------|--|
| Performed Procedure Step Start Date  | 0040,0244 | Copied from (0008,0020) Study Date.        |
| Performed Procedure Step Start Time  | 0040,0245 | Copied from (0008,0030) Study Time.        |
| Performed Procedure Step ID          | 0040,0253 | Copied from (0020,0010) Study ID.          |
| Performed Procedure Step Description | 0040,0254 | Copied from (0008,1030) Study Description. |

If the SCU does not propose a presentation context for the Grayscale Softcopy Presentation State storage SOP class, then ViewForum R4.1 will derive Presentation State data from the imported image data and store this data in a new series within the examination of the imported image.

However, if during import the image is accompanied by Presentation State data, the ViewForum R4.1 database shall avoid data overlap by only storing the relevant data from the first object received; either the first image or its Presentation State!

Thus it will omit data received by succeeding objects concerning the optional attributes (VT=3) listed in Table 96, and clear all mandatory attributes (VT=2) listed in Table 97.

**Table 96: Omitted Attributes for Import Images**

| Attribute Name                                     | Attribute Tag |
|--|---------------|
| <b>Patient Module</b>                              |               |
| Referenced Patient Sequence                        | 0008,1120     |
| Patient's Birth Time                               | 0010,0032     |
| Other Patient Ids                                  | 0010,1000     |
| Other Patient Names                                | 0010,1001     |
| Ethnic Group                                       | 0010,2160     |
| Patient Comments                                   | 0010,4000     |
| <b>General Study Module</b>                        |               |
| Referring Physician Identification Sequence        | 0008,0096     |
| Study Description                                  | 0008,1030     |
| Procedure Code Sequence                            | 0008,1032     |
| Physician(s) of Record                             | 0008,1048     |
| Physician(s) of Record Identification Sequence     | 0008,1049     |
| Name of Physician(s) Reading Study                 | 0008,1060     |
| Physician(s) Reading Study Identification Sequence | 0008,1062     |
| Referenced Study Sequence                          | 0008,1110     |
| <b>Patient Study Module</b>                        |               |
| Admitting Diagnoses Description                    | 0008,1080     |
| Admitting Diagnoses Code Sequence                  | 0008,1084     |
| Patient's Age                                      | 0010,1010     |
| Patient's Size                                     | 0010,1020     |
| Patient's Weight                                   | 0010,1030     |
| Occupation   | 0010,2180     |
| Additional Patient History                         | 0010,21B0     |
| <b>Clinical Trial Study Module</b>                 |               |
| Clinical Trial Time Point Description              | 0012,0051     |
| <b>General Series Module</b>                       |               |
| Series Date  | 0008,0021     |
| Series Time  | 0008,0031     |
| Series Description                                 | 0008,103E     |
| Performing Physicians' Name                        | 0008,1050     |
| Performing Physician Identification Sequence       | 0008,1052     |
| Operators' Name                                    | 0008,1070     |
| Operators Identification Sequence                  | 0008,1072     |
| Referenced Performed Procedure Step Sequence       | 0008,1111     |
| Body Part Examined                                 | 0018,0015     |
| Protocol Name                                      | 0018,1030     |
| Smallest Pixel Value in Series                     | 0028.0108     |
| Largest Pixel Value in Series                      | 0028.0109     |
| Performed Procedure Step Start Date                | 0040,0244     |
| Performed Procedure Step Start Time                | 0040,0245     |
| Performed Procedure Step ID                        | 0040,0253     |
| Performed Procedure Step Description               | 0040,0254     |
| Performed Protocol Code Sequence                   | 0040,0260     |
| Request Attributes Sequence                        | 0040,0275     |
| Comments on the Performed Procedure Step           | 0040,0280     |
| <b>General Equipment Module</b>                    |               |
| Institution Name                                   | 0008,0080     |
| Institution Address                                | 0008,0081     |
| Station Name                                       | 0008,1010     |
| Institutional Department Name                      | 0008,1040     |
| Manufacturer's Model Name                          | 0008,1090     |
| Device Serial Number                               | 0018,1000     |

| Attribute Name                               | Attribute Tag |
|--|---------------|
| Software Versions                            | 0018,1020     |
| Spatial Resolution                           | 0018,1050     |
| Date of Last Calibration                     | 0018,1200     |
| Time of Last Calibration                     | 0018,1201     |
| Pixel Padding Value                          | 0028,0120     |
| <b>Display Shutter Module</b>                |               |
| Shutter Presentation Value                   | 0018,1622     |
| <b>Overlay Plane Module</b>                  |               |
| Overlay Description                          | 60xx,0022     |
| Overlay Subtype                              | 60xx,0045     |
| ROI Area                                     | 60xx,1301     |
| ROI Mean                                     | 60xx,1302     |
| ROI Standard Deviation                       | 60xx,1303     |
| Overlay Label                                | 60xx,1500     |
| <b>SOP Common Module</b>                     |               |
| Instance Creation Date                       | 0008,0012     |
| Instance Creation Time                       | 0008,0013     |
| Instance Creator UID                         | 0008,0014     |
| Coding Scheme Identification Sequence        | 0008,0110     |
| Timezone Offset From UTC                     | 0008,0201     |
| Contributing Equipment Sequence              | 0018,A001     |
| Instance Number                              | 0020,0013     |
| SOP Instance Status                          | 0100,0410     |
| SOP Authorization Date and Time              | 0100,0420     |
| SOP Authorization Comment                    | 0100,0424     |
| Authorization Equipment Certification Number | 0100,0426     |
| MAC Parameters Sequence                      | 4FFE,0001     |
| Digital Signatures Sequence                  | FFFA,FFFA     |

**Table 97: Cleared Attributes for Import Images**

| Attribute Name                          | Attribute Tag |
|---|---------------|
| <b>Patient Module</b>                   |               |
| Patient's Name                          | 0010,0010     |
| Patient ID                              | 0010,0020     |
| Patient's Birth Date                    | 0010,0030     |
| Patient's Sex                           | 0010,0040     |
| <b>Clinical Trial Subject Module</b>    |               |
| Clinical Trial Protocol Name            | 0012,0021     |
| Clinical Trial Site ID                  | 0012,0030     |
| Clinical Trial Site Name                | 0012,0031     |
| <b>General Study Module</b>             |               |
| Study Date                              | 0008,0020     |
| Study Time                              | 0008,0030     |
| Accession Number                        | 0008,0050     |
| Referring Physician's Name              | 0008,0090     |
| Study ID                                | 0020,0010     |
| <b>Clinical Trial Study Module</b>      |               |
| Clinical Trial Time Point ID            | 0012,0050     |
| <b>General Series Module</b>            |               |
| Patient Position                        | 0018,5100     |
| Series Number                           | 0020,0011     |
| Laterality                              | 0020,0060     |
| <b>Clinical Trial Series Module</b>     |               |
| Clinical Trial Coordinating Center Name | 0012,0060     |
| <b>General Equipment Module</b>         |               |
| Manufacturer                            | 0008,0070     |
| <b>Mask Module</b>                      |               |
| Recommended Viewing Mode                | 0028,1090     |
| <b>Overlay/Curve Activation Module</b>  |               |
| Curve Activation Layer                  | 50xx,1001     |
| Overlay Activation Layer                | 60xx,1001     |

ViewForum R4.1 allows the operator to modify attributes of the stored images; see Table 98.

ViewForum R4.1 does not modify the pixel values of the stored images. Modified images retain their original Study, Series and Image UID.

**Table 98: Modifiable Attributes**

| Attribute Name                           | Attribute Tag |
|--|---------------|
| <b>Patient</b>                           |               |
| Patient's Name                           | 0010,0010     |
| Patient ID                               | 0010,0020     |
| Patient's Birth Date                     | 0010,0030     |
| Patient's Sex                            | 0010,0040     |
| Medical Alerts                           | 0010,2000     |
| Contrast Allergies                       | 0010,2110     |
| Patient Comments                         | 0010,4000     |
| <b>Study</b>                             |               |
| Accession Number                         | 0008,0050     |
| Referring Physician's Name               | 0008,0090     |
| Study Description                        | 0008,1030     |
| Physician(s) of Record                   | 0008,1048     |
| Name of Physician(s) Reading Study       | 0008,1060     |
| Admitting Diagnoses Description          | 0008,1080     |
| Patient's Age                            | 0010,1010     |
| Occupation                               | 0010,2180     |
| Additional Patient History               | 0010,21B0     |
| <b>Examination</b>                       |               |
| Performed Station Name                   | 0040,0242     |
| Performed Location                       | 0040,0243     |
| Performed Procedure Step Description     | 0040,0254     |
| Performed Procedure Type Description     | 0040,0255     |
| Comments on the Performed Procedure Step | 0040,0280     |
| <b>Series</b>                            |               |
| -  | -             |

## 8.2 Data Dictionary of Private Attributes

Not applicable.

## 8.3 Coded Terminology and Templates

Not applicable.

## 8.4 Grayscale Image consistency

The high-resolution display monitor attached to the product can be calibrated by using the service tool together with a light probe. See the [VFRB] for details on the calibration procedure.

## 8.5 Standard Extended/Specialized/Private SOPs

Not applicable.

## 8.6 Private Transfer Syntaxes

None.