

syngo.via **VB10A**

SY

DICOM Conformance Statement

Rev. 3.0 2015-04-22

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SIEMENS Healthcare,
Henkestr. 127, D-91052 Erlangen, Germany

Headquarters: Berlin and Munich
Siemens AG, Wittelsbacher Platz 2, D-80333 Munich, Germany

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1 CONFORMANCE STATEMENT OVERVIEW

The **syngo.via** is comprised of a storage system (**syngo.via Application Server**), client review workstations (**syngo.via Client**) and connectivity to DICOM modalities and healthcare information systems. By default one **syngo.via (AE)** is used. It is possible to configure usage of multiple different AEs for the individual DICOM services.

The **syngo.via**:

- requests and provides storage of objects (images, reports, encapsulated PDF)
- requests and provides Storage Commitment for the stored objects
- support query and retrieval of objects from a remote node
- displays images to a user
- send/transmit images to a printer
- imports and exports objects from portable interchange media
- uses patient and procedure information from modality worklist requests to start a workflow
- retrieves requested procedure from RIS
- Send procedure information on acquisition start and end

The **syngo.via** conforms to the DICOM 3.0 2014a Standard and supports the network services as described in Table 1-1 and the media services as described in Table 1-2.

Table 1-1 Network Services

| SOP Classes | Service Class User (SCU) | Service Class Provider (SCP) |
|---|--------------------------|------------------------------|
| Verification | | |
| Verification Service | Yes | Yes |
| Transfer(Image SOP Class) | | |
| Breast Tomosynthesis Image Storage | Yes | Yes |
| Computed Radiography Image Storage | Yes | Yes |
| Computed Tomography Image Storage | Yes | Yes |
| Digital Mammography Image Storage for Presentation | Yes | Yes |
| Digital Mammography Image Storage for Processing | Yes | Yes |
| Digital X-Ray Image Storage for Presentation | Yes | Yes |
| Digital X-Ray Image Storage for Processing | Yes | Yes |
| Enhanced Computed Tomography Image Storage (store & forward only) | Yes | Yes |
| Enhanced MR Image Storage | Yes | Yes |
| Enhanced MR Color Image Storage | Yes | Yes |
| Enhanced XA Image Storage | Yes | Yes |

| SOP Classes | Service Class User (SCU) | Service Class Provider (SCP) |
|--|--------------------------|------------------------------|
| Enhanced XRF Image Storage | Yes | Yes |
| MR Image Storage | Yes | Yes |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | Yes | Yes |
| Multi-frame Grayscale Word Secondary Capture Image Storage | Yes | Yes |
| Multi-frame Single Bit Secondary Capture Image Storage | Yes | Yes |
| Multi-frame True Color Secondary Capture Image Storage | Yes | Yes |
| Nuclear Medicine Image Storage | Yes | Yes |
| PET Image Storage | Yes | Yes |
| RT Image Storage | Yes | Yes |
| Secondary Capture Image Storage | Yes | Yes |
| Ultrasound Image Storage | Yes | Yes |
| Ultrasound Image Storage (Retired) | Yes | Yes |
| Ultrasound Multi-Frame Image Storage | Yes | Yes |
| Ultrasound Multi-Frame Image Storage (Retired) | Yes | Yes |
| X-Ray 3D Angiographic Image Storage | Yes | Yes |
| X-Ray Angiographic Image Storage | Yes | Yes |
| X-Ray Radio-Fluoroscopic Image Storage | Yes | Yes |
| Transfer(Non-Image SOP Class) | | |
| 12-lead ECG Waveform Storage | Yes | Yes |
| Ambulatory ECG Waveform Storage | Yes | Yes |
| Basic Text Structured Report Storage | Yes | Yes |
| Blending Softcopy Presentation State Storage | Yes | Yes |
| Cardiac Electrophysiology Waveform Storage | Yes | Yes |
| Color Softcopy Presentation State Storage (store & forward only) | Yes | Yes |
| Comprehensive Structured Report Storage | Yes | Yes |
| Deformable Spatial Registration Storage | Yes | Yes |
| Encapsulated PDF Storage | Yes | Yes |
| Enhanced Structured Report Storage | Yes | Yes |
| General ECG Waveform Storage | Yes | Yes |
| Grayscale Softcopy Presentation State Storage (store & forward only) | Yes | Yes |
| Hemodynamic Waveform Storage | Yes | Yes |
| Key Object Selection Document Storage | Yes | Yes |
| Mammography CAD SR Storage | Yes | Yes |
| MR Spectroscopy Storage | Yes | Yes |
| Pseudo-Color Softcopy Presentation State Storage | Yes | Yes |
| Procedure Log Storage | Yes | Yes |
| Raw Data Storage | Yes | Yes |
| Real World Value Mapping Storage | Yes | Yes |
| RT Beams Treatment Record Storage | Yes | Yes |
| RT Dose Storage | Yes | Yes |

| SOP Classes | Service Class User (SCU) | Service Class Provider (SCP) |
|--|--------------------------|------------------------------|
| RT Ion Beams Treatment Record Storage | Yes | Yes |
| RT Ion Plan Storage | Yes | Yes |
| RT Plan Storage | Yes | Yes |
| RT Structure Set Storage | Yes | Yes |
| RT Treatment Summary Record Storage | Yes | Yes |
| Segmentation Storage | Yes | Yes |
| Spatial Fiducials Storage | Yes | Yes |
| Spatial Registration Storage | Yes | Yes |
| Surface Segmentation Storage | Yes | Yes |
| X-Ray Radiation Dose Structured Report Storage | Yes | Yes |
| Transfer (Private SOP Class) | | |
| CSA Non-Image Storage | Yes | Yes |
| Query / Retrieve | | |
| Patient Root – Query/Retrieve Information Model – FIND | Yes | Yes |
| Patient Root – Query/Retrieve Information Model – MOVE | Yes | Yes |
| Study Root – Query/Retrieve Information Model – FIND | Yes | Yes |
| Study Root – Query/Retrieve Information Model – MOVE | Yes | Yes |
| Patient/Study Only – Query/Retrieve Information Model – FIND | Yes | Yes |
| Patient/Study Only – Query/Retrieve Information Model – MOVE | Yes | Yes |
| Workflow Management | | |
| Storage Commitment Push Model | Yes | Yes |
| Modality Worklist Information Model – FIND | Yes | No |
| Modality Performed Procedure Step | Yes | No |
| Unified Procedure Step – Push | No | Yes |
| Print Management | | |
| Basic Grayscale Print Management Meta SOP Class | Yes | No |
| Basic Film Session SOP Class | Yes | No |
| Basic Film Box SOP Class | Yes | No |
| Basic Grayscale Image Box SOP Class | Yes | No |
| Printer SOP Class | Yes | No |
| Print Job SOP Class | Yes | No |
| Presentation LUT SOP Class | Yes | No |
| Basic Color Print Management Meta SOP Class | Yes | No |
| Basic Color Image Box SOP Class | Yes | No |

Table 1-2 Media Services

| Media Storage Application Profile | Write Files (FSC) | Read Files (FSR) |
|--|-------------------|------------------|
| Compact Disk – Recordable | | |
| STD-GEN-CD (augmented, see 5.2.1) | Yes | Yes |
| DVD – Recordable | | |
| STD-GEN-DVD (augmented, see 5.2.1) | Yes | Yes |
| STD-GEN-DVD-J2K (augmented, see 5.2.1) | Yes | Yes |
| USB | | |
| STD-GEN-USB-J2K (augmented, see 5.2.1) | Yes | Yes |

The **syngo.via Application Server** creates ISO files to be burnt by **syngo.via Client** local burning SW (if hardware and software are available). Therefore it is only possible to update DICOMDIRs before the burning process has been started. When selecting the 'Standard' profile from the export UI, the export job will be handled according to the STD-GEN-XXX profile; depending on which media has been selected. In case the 'Patient' profile is selected, the STD-GEN-XXX-J2K profile will be used, depending on which media or destination has been selected.

2 TABLE OF CONTENTS

| | | |
|-------------|---|-----------|
| 3.1 | REVISION HISTORY | 12 |
| 3.2 | GENERAL | 12 |
| 3.3 | AUDIENCE | 13 |
| 3.4 | REMARKS | 13 |
| 3.5 | TERMS AND DEFINITIONS | 13 |
| 3.6 | ABBREVIATIONS | 13 |
| 3.7 | REFERENCES | 14 |
| 3.8 | SCOPE AND FIELD OF APPLICATION | 15 |
| 4.1 | IMPLEMENTATION MODEL | 16 |
| 4.1.1 | Application Data Flow | 16 |
| 4.1.2 | Functional Definition of AE's | 17 |
| 4.1.2.1 | Verification | 17 |
| 4.1.2.2 | Storage | 17 |
| 4.1.2.3 | Storage Commitment | 17 |
| 4.1.2.4 | Query | 17 |
| 4.1.2.5 | Retrieve | 18 |
| 4.1.2.6 | Modality Worklist | 18 |
| 4.1.2.7 | Print | 18 |
| 4.1.2.8 | Create Workitem | 19 |
| 4.1.2.9 | Modality Performed Procedure Step | 19 |
| 4.1.3 | Sequencing of Real-World Activities | 20 |
| 4.2 | AE SPECIFICATIONS | 28 |
| 4.2.1 | <i>syngo.via</i> AE | 28 |
| 4.2.1.1 | SOP Classes supported | 28 |
| 4.2.1.2 | Association Establishment Policies | 29 |
| 4.2.1.2.1 | Asynchronous Nature | 29 |
| 4.2.1.2.2 | Implementation Identifying Information | 29 |
| 4.2.1.3 | Association Initiation Policy | 29 |
| 4.2.1.3.1 | Activity "Send To" | 30 |
| 4.2.1.3.1.1 | Description and Sequencing of Activities | 30 |
| 4.2.1.3.1.2 | Proposed Presentation Contexts | 31 |
| 4.2.1.3.1.3 | SOP specific Conformance for SOP classes | 32 |
| 4.2.1.3.1.4 | Encapsulation of SOP classes generated by <i>syngo.via</i> | 32 |
| 4.2.1.3.1.5 | Storage of DICOM private, CSA Non-Image | 33 |
| 4.2.1.3.1.6 | CT Derived object for LungCAD findings generated by <i>syngo.via</i> | 33 |
| 4.2.1.3.1.7 | Correction and Rearrangement | 35 |
| 4.2.1.3.2 | Activity "Send Initial Storage Commitment" | 35 |
| 4.2.1.3.2.1 | Description and Sequencing of Activities | 35 |
| 4.2.1.3.2.2 | Proposed Presentation Contexts | 36 |
| 4.2.1.3.2.3 | SOP specific Conformance for SOP classes | 36 |
| 4.2.1.3.3 | Activity "Send Reply to Commitment Requests on separate associations" | 37 |
| 4.2.1.3.3.1 | Description and Sequencing of Activities | 37 |
| 4.2.1.3.3.2 | Proposed Presentation Contexts | 37 |
| 4.2.1.3.3.3 | SOP specific Conformance for SOP classes | 37 |
| 4.2.1.3.4 | Activity "Querying a Remote Node" for Instances | 38 |
| 4.2.1.3.4.1 | Description and Sequencing of Activities | 38 |
| 4.2.1.3.4.2 | Proposed Presentation Contexts | 38 |
| 4.2.1.3.4.3 | SOP Specific Conformance Statement to Query SOP classes | 39 |
| 4.2.1.3.5 | Activity "Move SCU" | 40 |
| 4.2.1.3.5.1 | Description and Sequencing of Activities | 40 |
| 4.2.1.3.5.2 | Accepted Presentation Contexts | 41 |

| | | |
|--------------|--|-----------|
| 4.2.1.3.5.3 | SOP Specific Conformance Statement for Move SCU Classes | 41 |
| 4.2.1.3.6 | Activity "Querying a Remote Node" for Modality Worklist | 41 |
| 4.2.1.3.6.1 | Description and Sequencing of Activities | 41 |
| 4.2.1.3.6.2 | Proposed Presentation Contexts | 42 |
| 4.2.1.3.6.3 | SOP Specific Conformance for SOP Classes | 42 |
| 4.2.1.3.7 | Activity "Printing to a Remote Node" | 46 |
| 4.2.1.3.7.1 | Description and Sequencing of Activities | 46 |
| 4.2.1.3.7.2 | Proposed Presentation Contexts | 47 |
| 4.2.1.3.7.3 | SOP Specific Conformance Statement for Print SOP classes | 47 |
| 4.2.1.4 | Association Acceptance Policy | 56 |
| 4.2.1.4.1 | Activity "Receive Instances" | 57 |
| 4.2.1.4.1.1 | Description and Sequencing of Activities | 57 |
| 4.2.1.4.1.2 | Accepted Presentation Contexts | 57 |
| 4.2.1.4.1.3 | SOP-specific Conformance Statement for Storage SOP classes | 57 |
| 4.2.1.4.1.4 | Other SOP specific behavior | 58 |
| 4.2.1.4.2 | Activity "Receive Initial Storage Commitment Request" | 58 |
| 4.2.1.4.2.1 | Description and Sequencing of Activities | 58 |
| 4.2.1.4.2.2 | Accepted Presentation Contexts | 58 |
| 4.2.1.4.2.3 | SOP-Specific Conformance Statement for SC SOP classes | 58 |
| 4.2.1.4.3 | Activity "Receive Instance Retrieve Requests" | 59 |
| 4.2.1.4.3.1 | Description and Sequencing of Activities | 59 |
| 4.2.1.4.3.2 | Accepted Presentation Contexts | 59 |
| 4.2.1.4.3.3 | SOP Specific Conformance Statement to Query SOP classes | 60 |
| 4.2.1.4.3.4 | Hierarchical and Relational Queries | 65 |
| 4.2.1.4.3.5 | Return Codes | 65 |
| 4.2.1.4.4 | Activity "Move SCP" | 65 |
| 4.2.1.4.4.1 | Description and Sequencing of Activities | 65 |
| 4.2.1.4.4.2 | Accepted Presentation Contexts | 66 |
| 4.2.1.4.4.3 | SOP Specific Conformance Statement for Move SCP Classes | 66 |
| 4.2.1.4.4.4 | Return Codes | 67 |
| 4.2.1.4.5 | Activity "Create Workitem" | 67 |
| 4.2.1.4.5.1 | Description and Sequencing of Activities | 67 |
| 4.2.1.4.5.2 | Accepted Presentation Contexts | 67 |
| 4.2.1.4.5.3 | SOP specific Conformance for UPS Push SOP classes | 67 |
| 4.2.1.4.6 | Activity "Cancel Workitem" | 68 |
| 4.2.1.4.6.1 | Description and Sequencing of Activities | 68 |
| 4.2.1.4.6.2 | Accepted Presentation Contexts | 68 |
| 4.2.1.4.6.3 | SOP specific Conformance for UPS Push SOP classes | 68 |
| 4.2.1.4.7 | Activity "Create MPPS" | 69 |
| 4.2.1.4.7.1 | Description and Sequencing of Activities | 69 |
| 4.2.1.4.7.2 | Accepted Presentation Contexts | 69 |
| 4.2.1.4.7.3 | SOP specific Conformance for MPPS SOP class | 69 |
| 4.2.1.4.8 | Activity "Update MPPS" | 69 |
| 4.2.1.4.8.1 | Description and Sequencing of Activities | 69 |
| 4.2.1.4.8.2 | Accepted Presentation Contexts | 69 |
| 4.2.1.4.8.3 | SOP specific Conformance for MPPS SOP class | 70 |
| 4.2.2 | NETWORK INTERFACES | 71 |
| 4.2.2 | Physical Network Interface | 71 |
| 4.2.3 | Additional Protocols | 71 |
| 4.2.4 | IPv4 and IPv6 Support | 71 |
| 4.3 | CONFIGURATION | 71 |
| 4.3.1 | AE Title/Presentation Address Mapping | 71 |
| 4.3.1.1 | Local AE Titles | 71 |
| 4.3.1.2 | Remote AE Title/Presentation Address Mapping | 71 |
| 4.3.1.2.1 | Remote Association Initiators | 71 |
| 4.3.1.2.2 | Remote SCP's | 72 |
| 4.3.2 | Parameters | 72 |
| 5.1 | IMPLEMENTATION MODELS | 73 |

| | | |
|-------------|--|------------|
| 5.1.1 | Application Data Flow Diagram | 73 |
| 5.1.2 | Functional definitions of AEs | 73 |
| 5.1.3 | Sequencing of Real-World Activities | 74 |
| 5.1.4 | File Meta Information for Implementation Class and Version | 74 |
| 5.2 | AE SPECIFICATIONS | 75 |
| 5.2.1 | Media Storage AE – Specification | 75 |
| 5.2.1.1 | File Meta Information for <i>syngo.via</i> | 75 |
| 5.2.1.2 | Real-World Activities | 75 |
| 5.2.1.2.1 | Activity “Browse Directory Information” | 75 |
| 5.2.1.2.1.1 | Media Storage Application Profiles | 76 |
| 5.2.1.2.2 | Activity “Import into Application” | 76 |
| 5.2.1.2.3 | Real-World Activity “Export to local Archive Media” | 76 |
| 5.2.1.2.4 | Media Storage Application Profiles | 76 |
| 5.2.1.3 | SOP Classes and Transfer Syntaxes | 76 |
| 5.3 | AUGMENTED AND PRIVATE APPLICATION PROFILES | 85 |
| 5.3.1 | Augmented Application Profiles | 85 |
| 5.4 | MEDIA CONFIGURATION | 86 |
| 5.5 | ATTRIBUTE CONFIDENTIALITY PROFILES | 86 |
| 5.5.1 | De-identification | 86 |
| 6.1 | CHARACTER SETS FOR <i>syngo.via</i> | 91 |
| 7.1 | SECURITY PROFILES | 95 |
| 7.2 | ASSOCIATION LEVEL SECURITY | 95 |
| 7.3 | APPLICATION LEVEL SECURITY | 95 |
| 8.1 | SOP Classes supported | 96 |
| 8.2 | IOD CONTENTS | 99 |
| 8.2.1 | Created SOP Instance(s) | 99 |
| 8.2.2 | Data Dictionary of Private Attributes | 100 |
| 8.2.3 | Usage of Attributes from received IODs | 101 |
| 8.2.4 | Attribute mapping | 101 |
| 8.2.5 | Coerced / Modified fields | 101 |
| 8.3 | CODED TERMINOLOGY AND TEMPLATES | 102 |
| 8.3.1 | Context Groups | 102 |
| 8.3.2 | Template Specifications | 102 |
| 8.3.3 | Private Code definitions | 102 |
| 8.4 | GRAYSCALE IMAGE CONSISTENCY | 102 |
| 8.5 | STANDARD EXTENDED / SPECIALIZED / PRIVATE SOP CLASSES | 102 |
| 8.6 | DICOM Print SCU – detailed status displays | 102 |
| 8.6.1 | Common Status Information | 102 |
| 8.6.2 | Additional DICOM Execution Status Information | 106 |
| 8.7 | <i>syngo.via</i> tasks | 106 |
| 8.7.1 | CT Grayscale image result of Perfusion Tasks | 106 |
| 8.8 | ANNEX A – <i>syngo.Breast Care</i> | 111 |
| 8.8.1 | <i>syngo.Breast Care</i> | 111 |
| 8.8.1.1 | SOP Specific Conformance to Viewing Application | 111 |
| 8.8.1.2 | IOD Contexts for Image Text | 113 |

List of Tables

| | |
|--|----|
| Table 1-1 Network Services | 2 |
| Table 1-2 Media Services | 5 |
| Table 4-1: Association Policies | 29 |
| Table 4-2: Asynchronous Nature as an Association Initiator | 29 |
| Table 4-3: DICOM Implementation Class and Version | 29 |
| Table 4-4: Association initiation policies | 29 |
| Table 4-5: Proposed Presentation Contexts for Storage | 31 |
| Table 4-6: DICOM Command Response Status Handling Behavior | 32 |
| Table 4-7: DICOM Command Communication Failure Behavior | 32 |
| Table 4-8: Packed SOP Classes | 33 |
| Table 4-9: Proposed Presentation Contexts for Storage Commitment | 36 |
| Table 4-10: DICOM Command Response Status Handling Behavior | 36 |
| Table 4-11: DICOM Command Communication Failure Behavior | 37 |
| Table 4-12: Proposed Presentation Contexts for Storage Commitment | 37 |
| Table 4-13: DICOM Command Response Status Handling Behavior | 37 |
| Table 4-14: Proposed Presentation Contexts for Query | 38 |
| Table 4-15: Extended Negotiation as an SCU | 38 |
| Table 4-16: DICOM Command Response Status Handling Behavior | 39 |
| Table 4-17: DICOM Command Communication Failure Behavior | 39 |
| Table 4-18: Attributes supported for instance Query - SCU | 39 |
| Table 4-19: Proposed Presentation Contexts for Retrieve and Activity "MOVE SCU" | 41 |
| Table 4-20: DICOM Command Response Status Handling Behavior | 41 |
| Table 4-21: DICOM Command Communication Failure Behavior | 41 |
| Table 4-22: Proposed Presentation Contexts for Worklist | 42 |
| Table 4-23: Broad Query search keys | 42 |
| Table 4-24: Modality Worklist C-Find Return keys | 43 |
| Table 4-25: DICOM Command Response Status Handling Behavior | 46 |
| Table 4-26: DICOM Command Communication Failure Behavior | 46 |
| Table 4-27: Proposed Presentation Contexts for Print | 47 |
| Table 4-28: DICOM Command Communication Failure Behavior | 47 |
| Table 4-29: Attributes of N-Create-Request of Basic Film Session | 48 |
| Table 4-30: N-CREATE-RSP Status Handling Behavior | 48 |
| Table 4-31: Attributes for N-CREATE-RQ of Basic Film Box | 49 |
| Table 4-32: N-CREATE-RSP Response Status Handling Behavior for Basic Film Box SOP Class | 50 |
| Table 4-33: N-ACTION Response Status Handling Behavior for Basic Film Box SOP Class | 50 |
| Table 4-34: Attributes for N-SET-RQ of Basic Grayscale Image Box | 51 |
| Table 4-35: DICOM Command Response Status Handling Behavior for Basic Grayscale Image Box SOP Class | 52 |
| Table 4-36: Attributes for N-SET-RQ of Basic Color Image Box | 53 |
| Table 4-37: DICOM Command Response Status Handling Behavior for Basic Color Image Box SOP Class | 53 |
| Table 4-38: Attributes for N-CREATE-RQ of Presentation LUT SOP Class | 54 |
| Table 4-39: DICOM Command Response Status Handling Behavior for Presentation LUT SOP Class | 54 |
| Table 4-40: Used Printer N-EVENT-REPORT-RQ attributes | 55 |
| Table 4-41: Used Printer N-GET-RSP attributes | 55 |
| Table 4-42: Used Print Job N-EVENT-REPORT attributes | 55 |
| Table 4-43: Storage C-STORE Response Status | 57 |
| Table 4-44: Acceptable Presentation Contexts for Storage Commitment and Activity "Receive Commitment Request | 58 |
| Table 4-45: Storage Commitment N-EVENT-REPORT Response Status | 59 |
| Table 4-46: Acceptable Presentation Contexts Activity "Receive Instance Retrieve Request" | 59 |
| Table 4-47: Extended Negotiation as an SCP | 60 |
| Table 4-48: Attributes supported for instance Query SCP | 60 |

| | |
|--|-----|
| Table 4-49: Query C-FIND / C-CANCEL Response Status | 65 |
| Table 4-50: Acceptable Presentation Contexts for Retrieve and Activity "MOVE SCP" | 66 |
| Table 4-51: C-MOVE-RSP Service Parameters | 66 |
| Table 4-52: Retrieve C-MOVE Response Status | 67 |
| Table 4-53: Acceptable Presentation Contexts Activity "Create Workitem" | 67 |
| Table 4-54: UPS Push N-CREATE Response Status Handling Behavior | 67 |
| Table 4-55: Acceptable Presentation Contexts Activity "Cancel Workitem" | 68 |
| Table 4-56: UPS Push N-ACTION Response Status Handling Behavior | 68 |
| Table 4-57: Acceptable Presentation Contexts Activity "Create MPPS" | 69 |
| Table 4-58: MPPS N-CREATE Response Status Handling Behavior | 69 |
| Table 4-59: Acceptable Presentation Contexts Activity "Update MPPS" | 70 |
| Table 4-60: MPPS N-SET Response Status Handling Behavior | 70 |
| Table 4-61: Parameter List | 72 |
| Table 5-1: Implementation Class/Version Name - Media Interchange | 75 |
| Table 5-2: Media - Application Profiles and Real-World Activities | 75 |
| Table 5-3: SOP Classes and Transfer Syntaxes for STD-GEN-DVD-J2K and STD-GEN-USB-J2K | 76 |
| Table 5-4: SOP Classes and Transfer Syntaxes for STD-GEN-CD and STD-GEN-DVD Profile | 83 |
| Table 5-5: Private SOP Classes and Transfer Syntaxes for Augmented Media Profiles | 85 |
| Table 5-6: Application Level Confidentiality Profile Attributes | 86 |
| Table 6-1: Single-Byte Character Sets without Code Extension | 91 |
| Table 6-2: Single-Byte Characters Sets with Code Extension | 92 |
| Table 6-3: Multi-Byte Character Sets without Code Extension | 93 |
| Table 6-4: Multi-Byte Character Sets with Code Extension | 93 |
| Table 8-1 SOP CLASSES for Storage | 96 |
| Table 8-2: Supported Non-Storage SOP Classes | 98 |
| Table 8-3: List of created SOP Classes | 99 |
| Table 8-4: Private Data Element Dictionary | 101 |
| Table 8-5: CT Grayscale image result of CT Perfusion Tasks | 106 |
| Table 8-6: Enhanced CT image result of CT Perfusion Tasks | 109 |
| Table 8-7: Requirements for Mammography Images | 111 |
| Table 8-8: Requirements for Breast Tomosynthesis Image encoded as CT | 111 |
| Table 8-9: Requirements for DICOM Breast Tomosynthesis Images | 111 |
| Table 8-10: Common Requirements for Mammography and Breast Tomosynthesis Images | 112 |
| Table 8-11: Requirements for Mammography CAD SR | 112 |
| Table 8-12: DICOM Tags used for Image Text | 113 |

List of Figures

| | |
|---|----|
| Figure 3.8-1: Overview about DICOM capabilities of <i>syngo.via</i> VB10A | 15 |
| Figure 4.1-1: Application Data Flow Diagram..... | 16 |
| Figure 4.1-2: Sequence diagram – Verify..... | 20 |
| Figure 4.1-3: Sequence diagram – Storage / Storage Commitment..... | 21 |
| Figure 4.1-4: Sequence diagram – Query/Retrieve | 22 |
| Figure 4.1-5: Sequence diagram – Modality Worklist | 23 |
| Figure 4.1-6: Sequence diagram – Printing..... | 24 |
| Figure 4.1-7: Sequence diagram – Create Workitem..... | 25 |
| Figure 4.1-8: Sequence diagram – Create MPPS..... | 26 |
| Figure 4.1-9: Sequence diagram – Update MPPS..... | 27 |
| Figure 5.1-1: Media Interchange Application Data Flow Diagram | 73 |
| Figure 5.1-2: Sequence diagram – Media creation | 74 |

3 INTRODUCTION

3.1 REVISION HISTORY

| Version/ Status | Date of Issue | Product / Version | Author | Change & Reason of Change |
|--------------------|---------------|----------------------|-----------------------|---|
| 0.1 | 2014-12-05 | syngo.via VB10A | DF TI EVO HU O 4 3 | Draft version for syngo.via VB10A based on version 3.0 of syngo.via VA30. - Updated table 8-3 (List of created SOP Classes) - Updated table 4-8(Packed SOP Classes) - Updated table 5-6(De-identification updated to DICOM 3.0 2014a) - Updated table 4-18 (Query SCU attributes) - Updated table 4-51 (Query SCP attributes) - MPPS N-CREATE and N-SET added - CT Derived object for LungCAD findings added |
| 0.2 | 2014-12-17 | syngo.via VB10A | DF TI EVO HU O 4 3 | - Update MPPS service description - Sequence diagram for Verify added - Updated status code handling for printing |
| 1.0 | 2014-12-18 | syngo.via VB10A | DF TI EVO HU O 4 3 | Released without changes. |
| 1.1 | 2015-02-12 | syngo.via VB10A | DF TI EVO HU O 4 3 | Header fixed and additional description added to Table 5-6 : Application Level Confidentially Profile Attributes |
| 2.0 | 2015-02-24 | syngo.via VB10A | DF TI EVO HU O 4 3 | Table 1-1 updated with Ultrasound SOP classes and transfer SOP classes categorized. Terms and Definitions chapter added. |
| 2.1 | 2015-04-17 | syngo.via VB10A | DF TI EVO HU O 4 3 | Updated tables (Magnetic Resonance) Table 8-3 updated with "Internally used" column |
| 3.0 | 2015-04-22 | syngo.via VB10A | DF TI EVO HU O 4 3 | Released after changes. Updated tables (MR Image Storage, MR Color Image Storage) Table 8-3 updated with "CT Image Storage" Updated chapter 8.7.1 |

3.2 GENERAL

The Conformance Statement describes the DICOM interface for the Siemens **syngo.via** in terms of part 2 of [1].

3.3 AUDIENCE

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

3.4 REMARKS

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality as SCU and SCP, respectively.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication with Siemens and other vendors' medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM 3.0 Standard [1]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity.
- Test procedures should be defined and tests should be performed by the user to validate the connectivity desired. DICOM itself and the conformance parts do not specify this.
- The standard will evolve to meet the users' future requirements. Siemens is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

Siemens reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local Siemens representative for the most recent product information.

3.5 TERMS AND DEFINITIONS

Terms used in this document shall be interpreted as defined in the DICOM Standard.

3.6 ABBREVIATIONS

| | |
|-------|--|
| ACR | American College of Radiology |
| AE | DICOM Application Entity |
| ASCII | American Standard Code for Information Interchange |
| DB | Database |
| DCS | DICOM Conformance Statement |
| DSA | Digital Subtraction Angiography |
| IIDC | Image-Intensifier Distortion Correction |
| IOD | DICOM Information Object Definition |
| ISO | International Standard Organization |
| MWL | Modality Worklist |
| MPPS | Modality Performed Procedure Step |
| NEMA | National Electrical Manufacturers Association |
| O | Optional Key Attribute |
| PDU | DICOM Protocol Data Unit |
| R | Required Key Attribute |
| RIS | Radiology Information System |
| SC | Storage Commitment |
| SCU | DICOM Service Class User |

| | |
|-----|-------------------------------------|
| SCP | DICOM Service Class Provider |
| SOP | DICOM Service-Object Pair |
| SCS | Specific Character Set |
| U | Unique Key Attribute |
| UPS | Unified Worklist and Procedure Step |

3.7 REFERENCES

- [1] Digital Imaging and Communications in Medicine (DICOM), PS 3.1-2014a – PS 3.20-2014a, National Electrical Manufacturers Association (NEMA), <http://medical.nema.org/>
- [2] IHE Radiology Technical Framework, Vol. I – IV, http://www.ihe.net/Technical_Frameworks

3.8 SCOPE AND FIELD OF APPLICATION

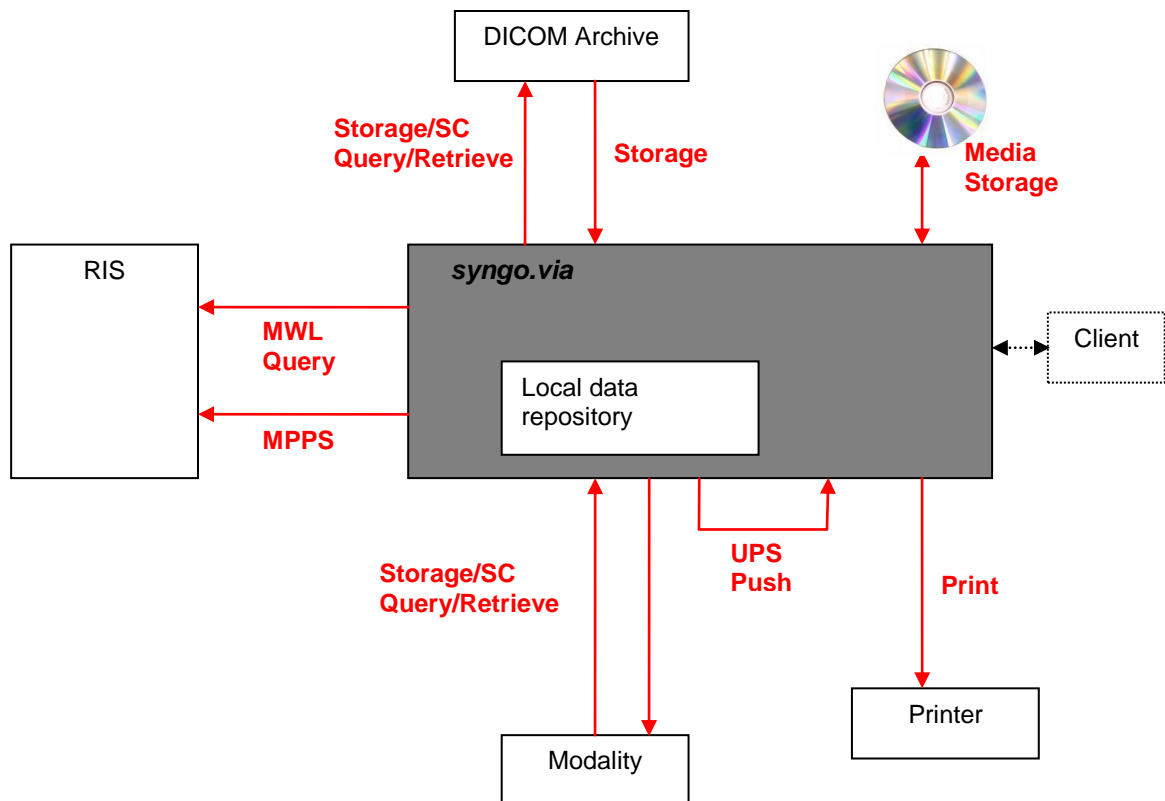


Figure 3.8-1: Overview about DICOM capabilities of *syngo.via* VB10A

4 NETWORKING

4.1 IMPLEMENTATION MODEL

4.1.1 Application Data Flow

The Application Data Flow diagram in Figure 4.1-1 depicts the DICOM data flow to and from the individual applications within **syngo.via**.

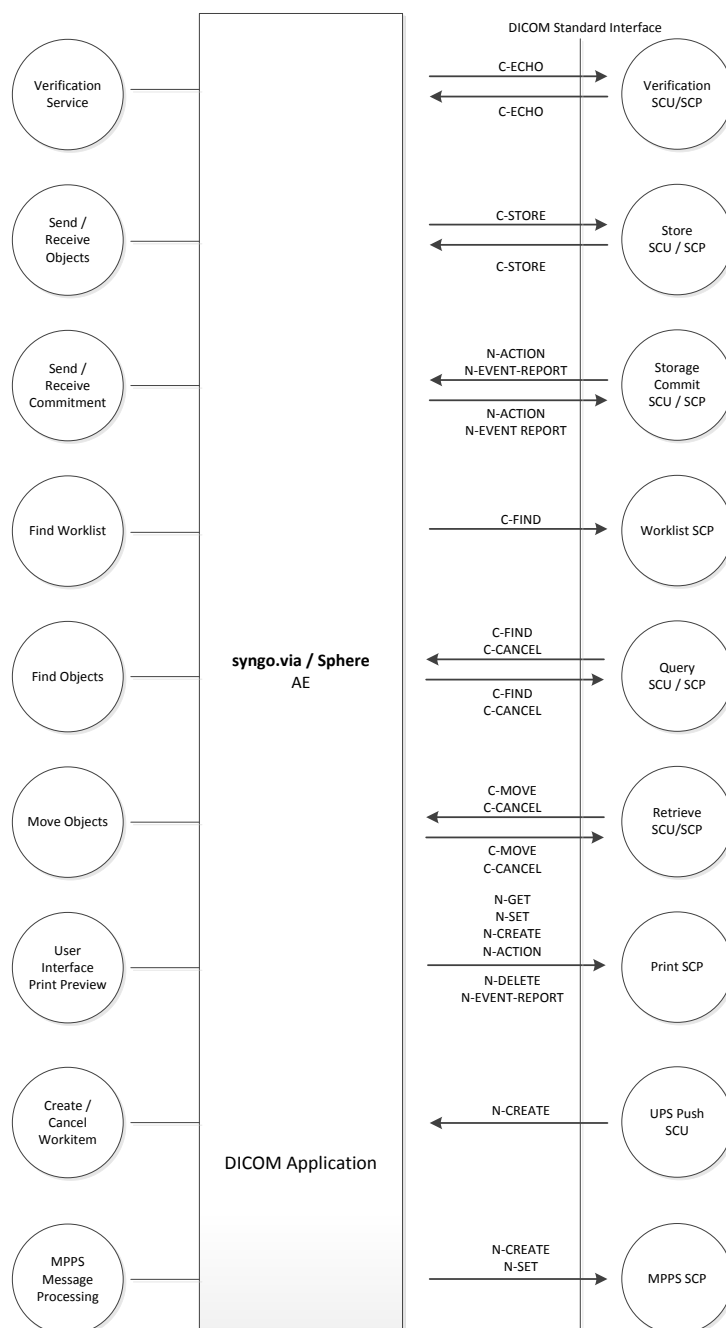


Figure 4.1-1: Application Data Flow Diagram

4.1.2 Functional Definition of AE's

The SCP components of the Application Entities of the **syngo.via** operate as background server processes. They exist as soon as the system is powered up and wait for association requests. Upon accepting an association with a negotiated Presentation Context they start to receive and process the requests described in the following sections.

The SCU components of the Application Entity are invoked upon requests from the user interface or indirect by trigger from internal processes.

4.1.2.1 Verification

Verification requests will be processed and responded by the **syngo.via** AE. The **syngo.via** AE can also initiate an association and request verification to a remote AE.

4.1.2.2 Storage

The **syngo.via** Storage SCU is invoked either directly by the user, by an auto-archive trigger or internally by the Query/Retrieve Application Entity that is responsible for processing retrieve requests. The request consists of data describing the composite objects selected for storage and the destination AET. An association is negotiated with the destination AE and the image data is transferred using the DIMSE C-STORE -Service. The transfer status is reported to the initiator of the Storage request.

The **syngo.via** Storage SCP starts to receive the Composite Image Objects and import them into the database after accepting an association with a negotiated Presentation Context. The system can be configured in such a way, that Responses to the Storage Request are sent immediately after reception of the Data, or after persistent storage on the hard disc or after storage & indexing in the DB.

4.1.2.3 Storage Commitment

The **syngo.via** serves as a SCU for the DICOM Storage Commitment service. Upon successful completion of a storage job, the system uses the DIMSE N-ACTION Service to request storage commitment from a DICOM storage commitment SCP. This can either be the same as the storage destination or storage commitment can be requested from a different system depending on the system configuration.

Storage Commitment Request will be sent after a configurable delay of storing the objects. The Storage Commitment SCP will always send the N-EVENT-REPORT Request on a new association.

The **syngo.via** can also serve as a SCP for the DICOM Storage Commitment service. Additional to each successfully completed send job, modalities should trigger a Storage Commitment request for the safekeeping of the images sent to the **syngo.via**.

4.1.2.4 Query

The C-FIND request to the remote SCP is invoked directly by the user. The remote SCP returns a list of responses with defined data, which are displayed to the user. The user can decide to start retrieving any of the responses or to issue another query.

The **syngo.via** supports as SCU

- Study Root Query Model.
- Patient Root Query Model

- Patient/Study Only Query Model
- Furthermore the SCU services may issue relational queries, if supported by the SCP node and required by the querying Application.

The C-FIND SCP will perform a query on the local data repository and return the matching items.

The **syngo.via** supports as SCP

- Study Root Query Model.
- Patient Root Query Model
- Patient/Study Only Query Model
- Furthermore the C-Find SCP service supports and negotiates relational queries.

4.1.2.5 Retrieve

The **syngo.via** initiates a C-MOVE request to the remote Retrieve SCP. The remote Retrieve SCP in turn starts C-STORE sub operations to the **syngo.via** Storage SCP.

The **syngo.via** supports as SCU

- Study Root Retrieve Model.
- Patient Root Query Model in case relational queries are supported
- Patient/Study Only Query Model in case relational queries are supported

The **syngo.via** responds to C-MOVE requests from a remote SCU. C-MOVE requests involve the **syngo.via** DICOM Query/Retrieve SCP application to initiate a C-STORE sub-operation to send image objects to a remote Storage SCP.

The **syngo.via** supports as SCP

- Study Root Retrieve Model.
- Patient Root Retrieve Model
- Patient/Study Only Retrieve Model

4.1.2.6 Modality Worklist

The **syngo.via** worklist SCU issues DICOM Modality Worklist requests using DIMSE C-FIND requests. The results in the C-FIND response are stored in **syngo.via** internal database and used for assigning subsequent processing steps in case instances are received via DIMSE C-STORE.

4.1.2.7 Print

The **syngo.via** DICOM print application supports print management DIMSE services as SCU.

The **syngo.via** Print SCU is invoked by the user interface to setup film-sheet layout and whenever an image is ready to be printed on film. The **syngo.via** will hold and maintain all data

needed to compile a complete film-sheet from the data (images, layout and configuration) selected. Whenever a film-sheet is ready to be printed, the related data are used to supply the Information to the SOP Classes of the Print Management Service Class. A queue is maintained, in order to intermediately store several film-sheets in case of resource problems on the printer.

The **syngo.via** will supply and require the mandatory SOP Classes of the Print Management Service Class as well as the optional Print Job and Presentation LUT SOP Classes.

4.1.2.8 Create Workitem

The **syngo.via** UPS Push SCP receives N-CREATE requests and creates a workitem for the appropriate study with "Scheduled" workflow state.

4.1.2.9 Modality Performed Procedure Step

The **syngo.via** MPPS SCU sends:

- N-CREATE request to inform the Information System that the performance of the Procedure Step has been started.
- N-SET request inform the Information System about the finalization of the Procedure Step(completed or discontinued).

4.1.3 Sequencing of Real-World Activities

Verify:

The communication between **syngo.via** and an external DICOM node in case of Verify is depicted in Figure 4.1-2 in more detail.

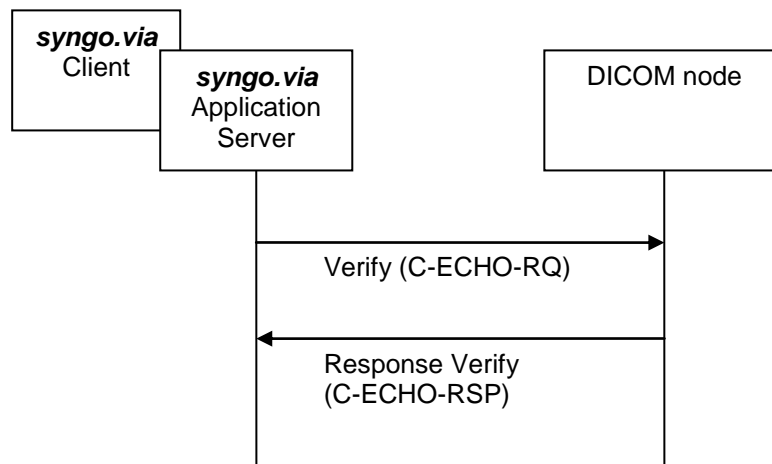


Figure 4.1-2: Sequence diagram – Verify

Storage / Storage Commitment:

The communication between **syngo.via** and an external DICOM node in case of triggering the transfer of objects from **syngo.via** to the external node is depicted in Figure 4.1-3 in more detail.

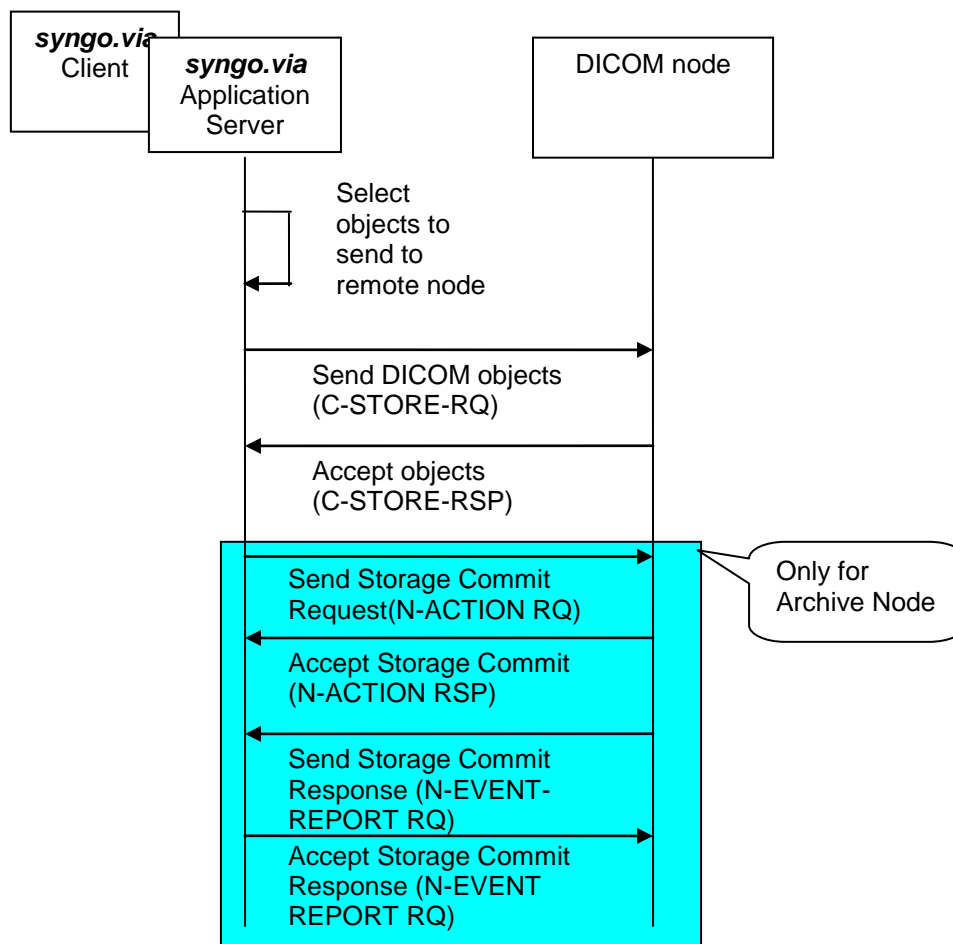


Figure 4.1-3: Sequence diagram – Storage / Storage Commitment

Query and Retrieval:

The communication between **syngo.via** and an external DICOM node in case of querying of objects from a remote DICOM node and retrieval to **syngo.via** is depicted in Figure 4.1-4 in more detail.

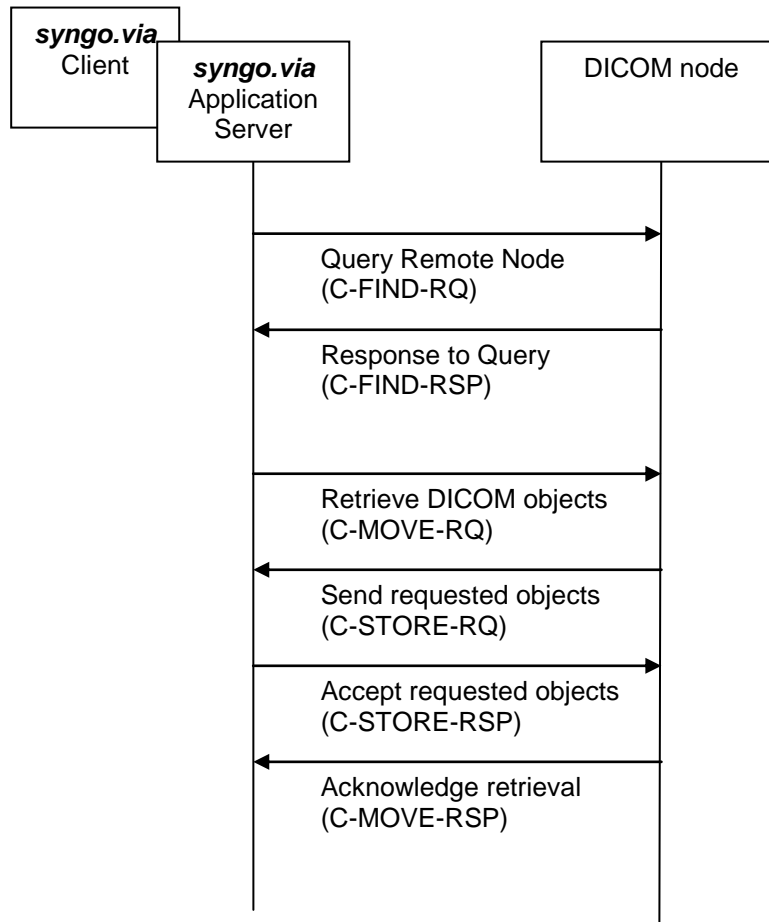


Figure 4.1-4: Sequence diagram – Query/Retrieve

Modality Worklist:

The communication between **syngo.via** and an external DICOM node in case of Modality Worklist requests from **syngo.via** to a remote DICOM node is depicted in Figure 4.1-5 in more detail.

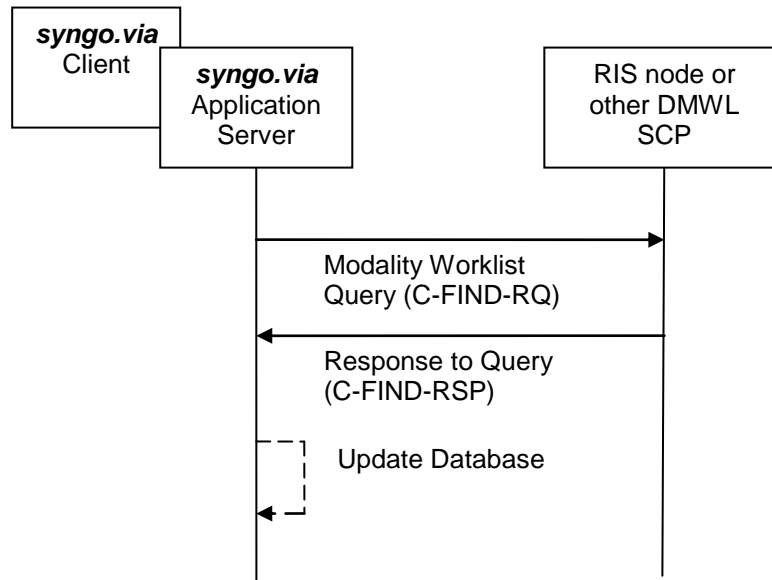
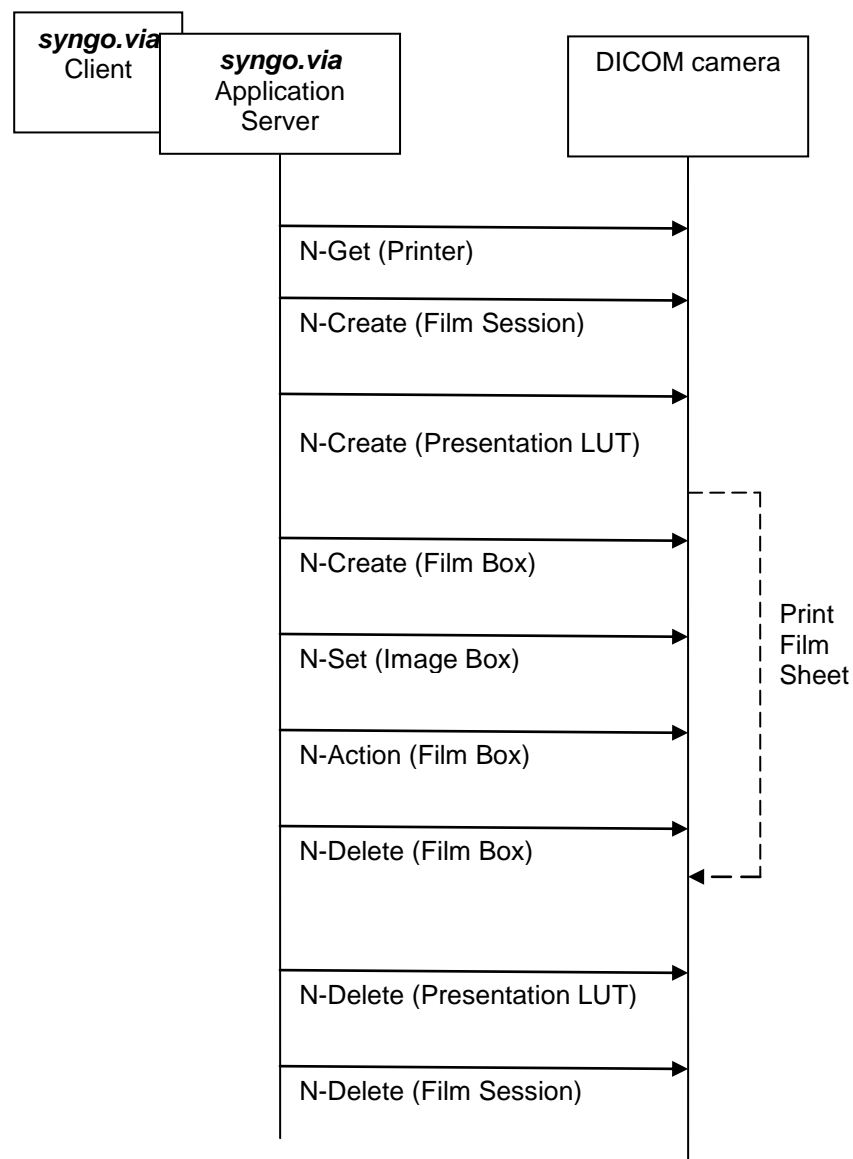


Figure 4.1-5: Sequence diagram – Modality Worklist

Printing:

The communication between **syngo.via** and an external DICOM camera in case of printing of images is depicted in Figure 4.1-6 in more detail.



All events (arrows) stand for a request / response pair.

Figure 4.1-6: Sequence diagram – Printing

Create Workitem:

The communication between **syngo.via** and an external DICOM node in case of workitem create requests is depicted in Figure 4.1-7 in more detail.

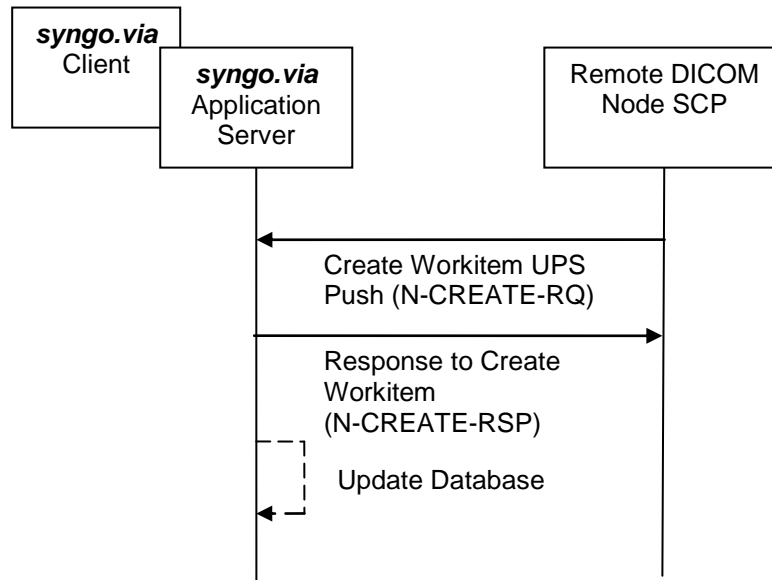


Figure 4.1-7: Sequence diagram – Create Workitem

Create MPPS:

The communication between **syngo.via** and an external DICOM node in case of create MPPS requests is depicted in Figure 4.1-8 in more detail.

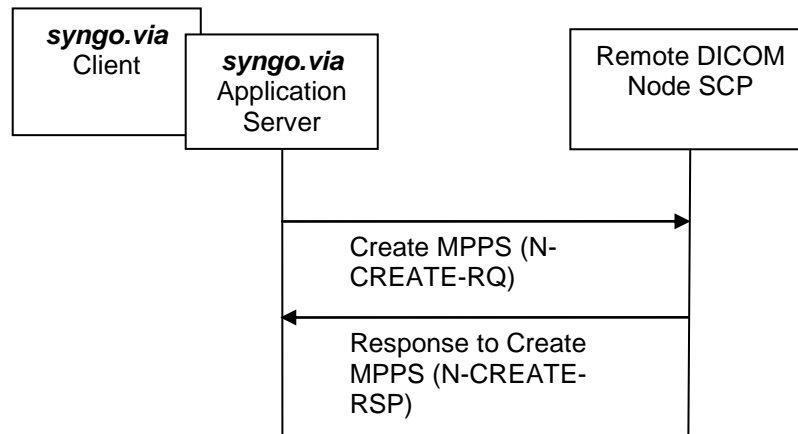


Figure 4.1-8: Sequence diagram – Create MPPS

Update MPPS:

The communication between **syngo.via** and an external DICOM node in case of update MPPS requests is depicted in Figure 4.1-9 in more detail.

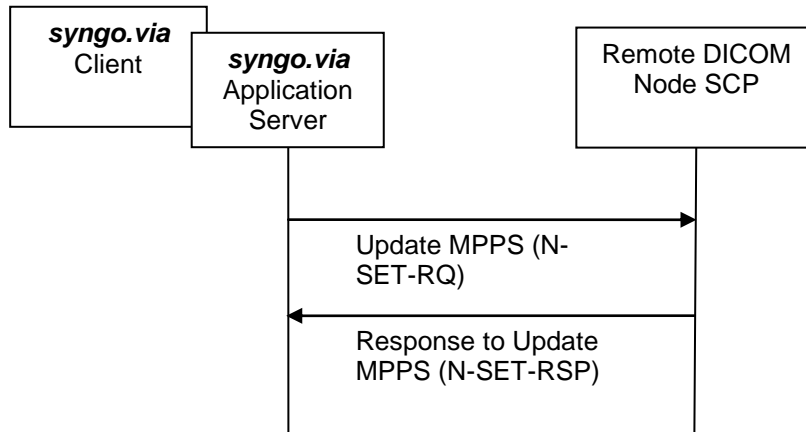


Figure 4.1-9: Sequence diagram – Update MPPS

4.2 AE SPECIFICATIONS

This section outlines the specifications for each of the Application Entities that are part of the *syngo.via* solution.

4.2.1 *syngo.via* AE

4.2.1.1 SOP Classes supported

This Application Entity provides Standard Conformance to the SOP Classes listed in Chapter 8 in Table 8-1 SOP CLASSES and

Table 8-2: Supported Non-Storage SOP Classes

4.2.1.2 Association Establishment Policies

Table 4-1: Association Policies

| | |
|---|-----------------------|
| Application Context Name | 1.2.840.10008.3.1.1.1 |
| PDU size | 32 kB ¹ |
| Maximum number of simultaneous associations as an association acceptor | 12 ¹ |
| Maximum number of simultaneous associations as an association initiator | unlimited |

The **syngo.via** AE contains a limitation of 512 kB for the maximum PDU size. By default, the maximum PDU size is set to 32kB.

The maximum number of simultaneous receiving associations (SCP) is configurable at run time, based on the system resources available. By default, the maximum number of associations is set to 12.

There is no inherent limit to the number of outgoing associations (SCU), other than limits imposed by the computer operating system. Nevertheless, transfer jobs to one distinct remote system (Send, Retrieve) will be run sequentially one after the other.

4.2.1.2.1 Asynchronous Nature

The **syngo.via** supports asynchronous communication (multiple outstanding transactions over a single association). On the SCU side the Window size proposed is infinite. On the SCP Side any non-infinite maximum size will be accepted.

Table 4-2: Asynchronous Nature as an Association Initiator

| | |
|---|----------|
| Maximum number of outstanding asynchronous transactions | Infinite |
|---|----------|

4.2.1.2.2 Implementation Identifying Information

Table 4-3: DICOM Implementation Class and Version

| | |
|-----------------------------|----------------------------------|
| Implementation Class UID | 1.3.12.2.1107.5.8.15.10.20090701 |
| Implementation Version Name | syngo.via |

4.2.1.3 Association Initiation Policy

syngo.via initiates associations while processing the service operations and internal messages as shown below:

Table 4-4: Association initiation policies

| Operation or Real-World Activity | Association for |
|----------------------------------|-----------------|
| Verification | C-ECHO |
| Send / Receive Instance | C-STORE |
| Storage Commitment | N-ACTION |

¹ Default, the value is configurable

| Operation or Real-World Activity | Association for |
|----------------------------------|--|
| | N-EVENT-REPORT |
| Querying a remote node | C-FIND |
| Retrieval of Instances | C-MOVE |
| Querying for Modality Worklist | C-FIND |
| Print Instance | N-GET N-SET N-CREATE N-ACTION N-DELETE N-EVENT-REPORT |
| UPS-Push | N-CREATE |
| MPPS | N-CREATE N-SET |

4.2.1.3.1 Activity "Send To"

4.2.1.3.1.1 Description and Sequencing of Activities

Storage of DICOM object is either triggered internally in the **syngo.via** (either "Send to" from the UI or triggered by auto-archiving events; see also Figure 4.1-3) or by a C-MOVE request initiated by an external DICOM AE to **syngo.via**.

If an association to a remote Application Entity could successfully be established, each image will be transferred one after another via the same open association.

Automatic retry mechanism:

it is configurable, how many retry attempts are performed before the job goes to failed.

Retries are performed if:

- the network connection has been lost from SCU perspective. In this case retry is performed as soon as the network connection is available again
- the partner is not reachable for other reasons (e.g. partner node has broken down) that appear to be transient. The number of retries and the interval between the retries are configurable (the default of retries is 2 and the interval is 30 seconds)

In case the transfer fails for a permanent reason (rejection permanent reported by SCP, all Presentation Contexts refused, ...) the transfer will not be retried.

4.2.1.3.1.2 Proposed Presentation Contexts

For all supported Transfer objects (see SOP Classes in Table 8-1) the following Transfer Syntaxes are supported:

Table 4-5: Proposed Presentation Contexts for Storage

| UID value | Transfer Syntax |
|------------------------|--|
| 1.2.840.10008.1.2.1 | Explicit Value Representation Little Endian native |
| 1.2.840.10008.1.2 | Implicit Value Representation Little Endian native |
| 1.2.840.10008.1.2.4.70 | JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14) lossless compressed |
| 1.2.840.10008.1.2.4.90 | JPEG 2000 Image Compression (Lossless Only) compressed |
| 1.2.840.10008.1.2.5 | RLE Lossless compressed |
| 1.2.840.10008.1.2.4.51 | JPEG Extended (Process 2 & 4) lossy compressed |
| 1.2.840.10008.1.2.4.50 | JPEG Baseline (Process 1) lossy compressed |
| 1.2.840.10008.1.2.4.91 | JPEG 2000 Image Compression lossy compressed |

Depending on the Configuration, the Storage SCU Service will choose a compressed or uncompressed Transfer Syntax among those accepted by the SCP. The Transfer Syntax chosen is the preferred one among the compressed and uncompressed ones. The preference order is the order of occurrence in the configuration. It is possible to configure for a specific node, which Transfer Syntax shall be used and which one shall be excluded. The configuration can even be extended, based on the combination of SOP Classes and supported Transfer Syntax. The configuration can be performed in the Service UI.

An instance will be JPEG lossless compressed only if it fulfills the following criteria:

- is an image and not already compressed
- Photometric Interpretation (0028,0004) is MONOCHROME or RGB or YBR_FULL or YBR_FULL_422
- Bits Allocated (0028,0100) equal to 16'D or 8'D
- Bits Stored (0028,0101) is >8
- High Bit (0028,0102) equal to Bits Stored (0028,0101) - 1
- Pixel Representation (0028,0103) equal to 0'D

An instance will be JPEG lossy compressed only if it fulfills the following criteria:

- is an image and not already compressed
- photometric interpretation (0028,0004) is MONOCHROME or RGB
- Bits Allocated (0028,0100) equal to 16'D or 8'D
- Bits Stored (0028,0101) equal to 12'D or 8'D
- High Bit (0028,0102) equal to Bits Stored (0028,0101) - 1
- Pixel Representation (0028,0103) equal to 0'D

An instance will be JPEG 2000 lossless compressed only if it fulfills the following criteria:

- is an image and not already compressed
- Photometric interpretation (0028,0004) not MONOCHROME or RGB or YBR_FULL or YBR_FULL_422
- Bits Allocated (0028,0100) not 16'D or 8'D

An instance will be JPEG 2000 lossy compressed only if it fulfills the following criteria:

- is an image and not already compressed
- Photometric interpretation (0028,0004) is MONOCHROME or RGB
- Bits Stored (0028,0101) equal to 12'D or 8'D

There is no extended negotiation as an SCU.

4.2.1.3.1.3 SOP specific Conformance for SOP classes

The **syngo.via** will not add or change private attributes by default, even in case objects are compressed or image header is updated according to IHE [2] Patient Information Reconciliation. The behavior of **syngo.via** when encountering status codes in a C-STORE response is summarized in Table 4-6:

Table 4-6: DICOM Command Response Status Handling Behavior

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|---|--------------------|---|
| Error | Duplicate SOP Instance UID: some of the instances sent to the SCP were already available there. | 0111 | Job is continued till the end and marked as Completed(!). A warning mentions that some images were already available on the remote node. These will not be overwritten. |
| Error | Out-Of-Resources: The remote node has run out of resources (storage resources for example) | A7XX | Job is continued till the end. An according message is shown to the user. |
| Error | Any other DIMSE Error Status | XXXX | Job is continued till the end. An according message is shown to the user. Error is logged in the system log. |
| Error | Sending partially or completely failed | Any none null Code | Failure reported to user (percentage of transferred instances is shown) |
| Success | Image is successfully stored on file system. | 0000 | Success reported to user |

Table 4-7: DICOM Command Communication Failure Behavior

| Exception | Behavior |
|---------------------|--|
| Timeout | Failure reported to user (Timeout configurable; default 30s) |
| Association Aborted | Failure reported to user |

4.2.1.3.1.4 Encapsulation of SOP classes generated by **syngo.via**

Some PACS systems do not support specific SOP classes, like for example:

- Encapsulated PDF (1.2.840.10008.5.1.4.1.1.104.1)
- Real World Value Mapping (1.2.840.10008.5.1.4.1.1.67)
- Spatial Registration (1.2.840.10008.5.1.4.1.1.66.1)
- Segmentation (1.2.840.10008.5.1.4.1.1.66.4)

In order to enable archiving of instances of such SOP classes, **syngo.via** packs them into a Basic Text Structured Report (SR) instance to enforce a SOP Class UID (0008,0016) '1.2.840.10008.5.1.4.1.1.88.11', supported by most PACS systems. In case that a PACS system

does not even support structured reports, the instance will be packed into a Secondary Capture (SC) image with the SOP Class UID (0008,0016) '1.2.840.10008.5.1.4.1.1.7' if clinical administrator chooses this option.

A well defined list (see Table 4-8) of **syngo.via** internally generated objects will be packed. The bulk data (Content Sequence (0040,A730), Modality Image Header Type (0029,0008), Modality Image Header Version (0029,0009), Modality Image Header Info (0029,0010), Pixel Data (7FE0,0010) and Series Description (0008,103E)) of such generated instances contain a coding indicating that this is a Siemens private object created for archival purposes only.

Table 4-8: Packed SOP Classes

| SOP Class Name | SOP Class UID |
|----------------------------------|-------------------------------|
| Basic Text Structured Report | 1.2.840.10008.5.1.4.1.1.88.11 |
| Comprehensive Structured Report | 1.2.840.10008.5.1.4.1.1.88.33 |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 |
| Enhanced Structured Report | 1.2.840.10008.5.1.4.1.1.88.22 |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 |
| Real World Value Mapping Storage | 1.2.840.10008.5.1.4.1.1.67 |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 |
| Surface Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.5 |

4.2.1.3.1.5 Storage of DICOM private, CSA Non-Image

When objects of SOP Class 1.3.12.2.1107.5.9.1 (DICOM private, CSA Non-Image) are received by **syngo.via** new instances of SOP Class 1.2.840.10008.5.1.4.1.1.66.1 (Spatial Registration) are created which include the information of the original objects. For each affected CSA Non-Image a new series is created for its own Spatial Registration object.

4.2.1.3.1.6 CT Derived object for LungCAD findings generated by **syngo.via**

| Attribute | Tag | Type | Description |
|------------------------|--------------|------|---|
| Specific Character Set | (0008, 0005) | 1C | Copied from Input Image |
| Image Type | (0008,0008) | 1 | Value 1: DERIVED Value 2: SECONDARY Value 3: AXIAL Value 4: AlgorithmName_AlgorithmVersion_DO |
| Instance Creation Date | (0008,0012) | 3 | DO ¹ instance creation date |
| Instance Creation Time | (0008,0013) | 3 | DO ¹ instance creation time |
| SOP Class UID | (0008,0016) | 1 | Copied from Input Image |
| SOP Instance UID | (0008,0018) | 1 | 1.3.12.2.1107.5.99.3.99.UID ² |

| Attribute | Tag | Type | Description |
|------------------------------------|-------------|------|--|
| Study Date | (0008,0020) | 2 | Copied from Input Image |
| Series Date | (0008,0021) | 3 | Creation Date of the DO ¹ in <YYYYMMDD> format |
| Acquisition Date | (0008,0022) | 3 | Copied from Input Image |
| Study Time | (0008,0030) | 2 | Copied from Input Image |
| Series Time | (0008,0031) | 3 | Creation Time of the DO ¹ in <HHMMSS> format |
| Acquisition Time | (0008,0032) | 3 | Copied from Input Image |
| Accession Number | (0008,0050) | 2 | Copied from Input Image |
| Modality | (0008,0060) | 1 | Copied from Input Image |
| Manufacturer | (0008,0070) | 2 | Copied from Input Image |
| Institution Name | (0008,0080) | 3 | Copied from Input Image |
| Referring Physician's Name | (0008,0090) | 2 | Copied from Input Image |
| Study Description | (0008,1030) | 3 | Copied from Input Image |
| Series Description | (0008,103E) | 3 | Series description as configured by the application |
| Name Of Physician(s) Reading Study | (0008,1060) | 3 | Copied from Input Image |
| Manufacturer's Model Name | (0008,1090) | 3 | Copied from Input Image |
| Derivation description | (0008,2111) | 3 | Set AlgorithmName_AlgorithmVersion_DO value. For example: LUNGCAD_VD10C_DO) |
| Source Image Sequence | (0008,2112) | 3 | Set input image SOP class UID and input image SOP instance UID from original image |
| >Reference SOP Class UID | (0008,1150) | | From original image's SOP Class UID |
| >Reference SOP Instance UID | (0008,1155) | | From original image's SOP Instance UID |
| Patient Name | (0010,0010) | 2 | Copied from Input Image |
| Patient ID | (0010,0020) | 2 | Copied from Input Image |
| Patient's Birth Date | (0010,0030) | 2 | Copied from Input Image |
| Patient's Sex | (0010,0040) | 2 | Copied from Input Image |
| Patient's Size | (0010,1020) | 3 | Copied from Input Image |
| Patient's Weight | (0010,1030) | 3 | Copied from Input Image |
| Pregnancy Status | (0010,21C0) | 3 | Copied from Input Image |
| Imager Pixel Spacing | (0018,1164) | 3 | Copied from Input Image |
| Patient Position | (0018,5100) | 2C | Copied from Input Image |
| View Position | (0018,5101) | 3 | Copied from Input Image |
| Detector Element Physical Size | (0018,7020) | 3 | Copied from Input Image |
| Detector Element Spacing | (0018,7022) | 3 | Copied from Input Image |
| Study Instance UID | (0020,000D) | 1 | Copied from Input Image |
| Series Instance UID | (0020,000E) | 1 | 1.3.12.2.1107.5.99.3.99.UID ² |
| Study ID | (0020,0010) | 2 | Copied from Input Image |
| Series Number | (0020,0011) | 2 | Series Number as configured by the user |
| Patient Orientation | (0020,0020) | 2 | Copied from Input Image |
| Image Laterality | (0020,0062) | 1 | Copied from Input Image |
| Samples PerPixel | (0028,0002) | 1 | Copied from input image |
| Photometric Interpretation | (0028,0004) | 1 | Copied from input image |

| Attribute | Tag | Type | Description |
|-----------------------------|-------------|------|--|
| Rows | (0028,0010) | 1 | Copied from input image |
| Columns | (0028,0011) | 1 | Copied from input image |
| Pixel Spacing | (0028,0030) | 1 | Copied from input image |
| Bits Allocated | (0028,0100) | 1 | Copied from input image |
| Bits Stored | (0028,0101) | 1 | Copied from input image |
| High Bit | (0028,0102) | 1 | Copied from input image |
| Pixel Representation | (0028,0103) | 1 | Copied from input image |
| Window Center | (0028,1050) | 1 | Copied from Input Image |
| Window Width | (0028,1051) | 1 | Copied from Input Image |
| Rescale Intercept | (0028,1052) | 1 | Copied from input image |
| Rescale Slope | (0028,1053) | 1 | Copied from input image |
| Rescale Type | (0028,1054) | 1 | Copied from input image |
| Presentation Creator's Name | (0070,0084) | 2 | Algorithm Name_Version_DO ¹ |
| Study Comments | (0032,4000) | 3 | Copied from input image |
| Pixel Data | (7FE0,0010) | 1 | Sets the Derived Pixel data |

1 – Derived Object

2 – UID generated by syngo.via

4.2.1.3.1.7 Correction and Rearrangement

When a Study is moved to:

- Procedure, the Study Instance UID is overwritten with the Study Instance UID and Accession Number of the Procedure.
- Patient, the system generates a new Study Instance UID.

The system will not update references to the changed Study Instance UIDs, therefore it is possible that there will be broken links between Studies after such move operations.

In case of Patient Merge and Correction no UIDs are changed, therefore it is advised to delete any corrected or rearranged objects from the PACS before attempting to archive them again, to ensure that the PACS system can store them successfully.

When the Patient Position (0018,5100) attribute is corrected, the following attributes are recalculated by the system:

- 1) Image Position (0020,0032)
- 2) Image Orientation (0020,0037)
- 3) Patient Orientation (0020,0020)
- 4) Data Collection Center (Patient) (0018,9313) (CT only)
- 5) Reconstruction Target Center(Patient) (0018,9318) (CT only)

Also the value of the Slice Location (0020,1041) attribute is emptied and a new Frame of Reference UID (0020,0052) is generated for the corrected series.

When the Patient Birth Date or the Study Date is corrected, the system recalculates the Patient Age. A new item containing attributes that were removed or replaced by other values is added to the Original Attribute Sequence (0400,0561).

4.2.1.3.2 Activity “Send Initial Storage Commitment”

4.2.1.3.2.1 Description and Sequencing of Activities

After sending Images to a configured Archive, the **syngo.via** will initiate a Storage Commitment request, if configured (see also Figure 4.1-3). The **syngo.via** initiates a new association in order

to send the N-ACTION-RQ to the SCP.

The Storage Commitment Request will be sent after the storage, delayed by a configurable amount of time in order to make sure that the remote node had enough time to index correctly the instances received (default delay is 10 minutes).

syngo.via will accept the N-Event-Report-RQ in the same association when sent immediately after the N-ACTION-RSP but will not wait for it (association will be closed after 3 seconds).

The system may issue one N-ACTION-RQ for a complete set (bundle) of instances or issue one N-ACTION-RQ per instance. This behavior is configurable; the default value is "bundled".

4.2.1.3.2.2 Proposed Presentation Contexts

Table 4-9: Proposed Presentation Contexts for Storage Commitment

| Presentation Context Table | | | | | |
|-------------------------------|----------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

4.2.1.3.2.3 SOP specific Conformance for SOP classes

The behavior of **syngo.via** when encountering status codes in an N-ACTION response is summarized in Table 4-10:

Table 4-10: DICOM Command Response Status Handling Behavior

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|--|--------------------|---|
| Error | Any failure that occurs | Any none null Code | Failure reported to user; corresponding object(s) will be marked as "Archived failed" |
| Success | All Instances are available on the remote node | 0000 | Success reported to user; in case failures exist, the corresponding instances will be marked as "Archived failed" |

Table 4-11: DICOM Command Communication Failure Behavior

| Exception | Behavior |
|---------------------|--|
| Timeout | Failure reported to user (Timeout configurable; default 30s); the request will be retried |
| Association Aborted | Failure reported to user; the request will be retried |

4.2.1.3.3 Activity “Send Reply to Commitment Requests on separate associations”

4.2.1.3.3.1 Description and Sequencing of Activities

In case the **syngo.via** has received a Storage Commitment request (N-ACTION-RQ) from an external node, the **syngo.via** initiates a new association in order to send the N-EVENT-REPORT-RQ to the SCU (Storage Commitment initiator).

4.2.1.3.3.2 Proposed Presentation Contexts

Table 4-12: Proposed Presentation Contexts for Storage Commitment

| Presentation Context Table | | | | | |
|-------------------------------|----------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

4.2.1.3.3.3 SOP specific Conformance for SOP classes

The behavior of **syngo.via** when encountering status codes in an N-EVENT-REPORT response is summarized in Table 4-13:

Table 4-13: DICOM Command Response Status Handling Behavior

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|-----------------------------------|--------------------|--------------------------------------|
| Error | Storage Commitment Reply ignored. | Any none null Code | Storage Commitment will be repeated. |
| Success | Storage Commitment Reply noticed. | 0000 | Success reported to user. |

syngo.via does not support the optional Storage Media File-Set ID and UID attributes in the N-ACTION.

4.2.1.3.4 Activity “Querying a Remote Node” for Instances**4.2.1.3.4.1 Description and Sequencing of Activities**

The associated Real-World activity is a C-Find request initiated by the user (see also Figure 4.1-4). The user specifies some attributes and will send a C-Find request (according to the query model) and will then return the results to the initiating application.

4.2.1.3.4.2 Proposed Presentation Contexts

The *syngo.via* will propose Presentation Contexts as shown in the following table:

Table 4-14: Proposed Presentation Contexts for Query

| Presentation Context Table | | | | | |
|---|-----------------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Patient Root Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | Yes |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| Study Root Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | Yes |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| Patient/Study Only Query/ Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.3.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | No |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

Table 4-15: Extended Negotiation as an SCU

| Name | UID | Extended Negotiation |
|--|-----------------------------|---|
| Patient Root Query/Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Relational Query will be negotiated if necessary as defined in DICOM PS3.4. |
| Study Root Query/ Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Relational Query will be negotiated if necessary as defined in DICOM PS3.4. |

4.2.1.3.4.3 SOP Specific Conformance Statement to Query SOP classes

The **syngo.via** checks for the following status codes in the Query SCP's C-FIND-Response:

Table 4-16: DICOM Command Response Status Handling Behavior

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|--|--------------------|------------------------------------|
| Failure | e.g. Out of Resources; Cancellation; Identifier does not match SOP Class; Unable to process | Any none null Code | Failure reported to user |
| Pending | All optional keys are supported the same manner as Required Keys. | FF00 | Pending state is indicated to user |
| | Matching Operation continues; some of the optional keys were not supported the same way as the required keys | FF01 | Pending state is indicated to user |
| Success | Query has been performed successfully. | 0000 | Success reported to user |

Table 4-17: DICOM Command Communication Failure Behavior

| exception | Behavior |
|---------------------|---|
| Timeout | Failure reported to user (Timeout configurable; default 30s) |
| Association Aborted | Failure reported to user |

The **syngo.via** supports the following query levels:

- Patient
- Study
- Series

Matching Keys on Instance Level is not supported by **syngo.via** as SCU.

The following table lists the various attributes at Patient, Study and Series levels, which can be used for **hierarchical** queries as well as return values for display. The display capabilities are highly configurable and "yes" indicates that it is possible to configure display of the data:

A "yes" in the **UI** column will indicate that the attribute may be visualized when browsing the Query results with the Browser. The Browser display is additionally influenced by the related Browser configuration

Table 4-18: Attributes supported for instance Query - SCU

| Attribute Name | Tag | Type | User input | UI |
|----------------------------------|-------------|------|-------------|-----|
| Patient Level¹ | | | | |
| Patient's Name | (0010,0010) | O | enter value | yes |
| Patient ID | (0010,0020) | O | enter value | yes |
| Patient's Birth Date | (0010,0030) | O | enter value | yes |
| Patient's Birth Time | (0010,0032) | O | enter value | yes |

| Attribute Name | Tag | Type | User input | UI |
|---|---------------------------|------|-------------|-----|
| Patient's Sex | (0010,0040) | O | enter value | yes |
| Study Level³ | | | | |
| Patient's Name | (0010,0010) | O | enter value | yes |
| Patient ID | (0010,0020) | O | enter value | yes |
| Patient's Birth Date | (0010,0030) | O | enter value | yes |
| Patient's Birth Time | (0010,0032) | O | enter value | yes |
| Patient's Sex | (0010,0040) | O | enter value | yes |
| Accession Number | (0008,0050) | O | enter value | yes |
| Study ID | (0020,0010) | O | enter value | yes |
| Study Instance UID | (0020,000D) | U | enter value | yes |
| Study Date | (0008,0020) | O | enter value | yes |
| Study Time | (0008,0030) | O | enter value | yes |
| Referring Physician's Name | (0008,0090) | O | enter value | yes |
| Study Description | (0008,1030) | O | enter value | yes |
| Number of Study related Instances | (0020,1208) | O | - | yes |
| Modalities in Study | (0008,0061) | O | enter value | yes |
| Number of Study Related Series | (0020,1206) | O | - | yes |
| Series Level | | | | |
| Modality | (0008,0060) | O | enter value | yes |
| Series Date | (0008,0021) | O | enter value | yes |
| Series Time | (0008,0031) | O | enter value | yes |
| Number of Series related Instances | (0020,1209) | O | - | yes |
| Series Number | (0020,0011) | O | enter value | yes |
| Series Description | (0008,103E) | O | enter value | yes |
| Request Attributes Sequence \ Requested Procedure ID | (0040,0275) \ (0040,1001) | O | enter value | yes |
| Request Attributes Sequence \ Scheduled Procedure Step ID | (0040,0275) \ (0040,0009) | O | enter value | yes |
| Performed Procedure Step Start Date | (0040,0244) | O | enter value | yes |
| Performed Procedure Step Start Time | (0040,0245) | O | enter value | yes |
| Series Instance UID | (0020,000E) | U | - | yes |

1 - Patient Root Information Model only

2 - Always a "*" is appended to the user-supplied string

3 - Study Root Information Model only

4.2.1.3.5 Activity "Move SCU"

4.2.1.3.5.1 Description and Sequencing of Activities

The C-MOVE-RQs are used to retrieve the referenced images. The Retrieve AE supports the query model Study Root.

4.2.1.3.5.2 Accepted Presentation Contexts

Table 4-19: Proposed Presentation Contexts for Retrieve and Activity “MOVE SCU”

| Presentation Context Table | | | | | |
|--|---------------------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Study Root Query/Retrieve Model – MOVE | 1.2.840.10008.5.1.4.1.2 .2.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | No |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

4.2.1.3.5.3 SOP Specific Conformance Statement for Move SCU Classes

At association establishment time the C-MOVE presentation context shall be negotiated. When the C-MOVE-RQ is processed, the Move Destination attribute (receiver of images) is ignored. However the Move Destination AE must conform to the DICOM conventions (value representation AE).

The behavior of **syngo.via** when encountering status codes in a C-MOVE response is summarized in Table 4-20:

Table 4-20: DICOM Command Response Status Handling Behavior

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|---|-------------------|-----------------------------------|
| Error | e.g. Out of Resources; Cancellation; Identifier does not match SOP Class; Unable to process; Move destination unknown | Any non null Code | Failure reported to user |
| Pending | Move Operation continues | FF00 | Operation continues in background |
| Success | Move has been performed successfully. | 0000 | Success reported to user |

Table 4-21: DICOM Command Communication Failure Behavior

| exception | Behavior |
|---------------------|---|
| Timeout | Failure reported to user (Timeout configurable; default 30s) |
| Association Aborted | Failure reported to user |

4.2.1.3.6 Activity “Querying a Remote Node” for Modality Worklist

4.2.1.3.6.1 Description and Sequencing of Activities

A network application will perform worklist queries with the C-FIND request at regular intervals. In addition it can be triggered by immediate request. The received worklist items will be compared with the contents of the local workflow management database. New items will be inserted into

workflow management database. The results are used to prepare subsequent workflow tasks, when receiving instances.

4.2.1.3.6.2 Proposed Presentation Contexts

Table 4-22: Proposed Presentation Contexts for Worklist

| Presentation Context Table | | | | | |
|----------------------------|-------------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Modality Worklist-FIND | 1.2.840.10008.5.1.4.3.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | No |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

4.2.1.3.6.3 SOP Specific Conformance for SOP Classes

- Search Key Attributes of the Worklist C-FIND

The **syngo.via** DICOM worklist SCU supports “broad worklist queries” with all required search keys. The following tables describe the “broad query” search keys that the SCU supports. The list is configurable in ‘DICOM Modality Worklist Query’.

Table 4-23: Broad Query search keys

| Attribute Name | Tag | Matching Key Type | Query Value |
|--|-------------|-------------------|-------------------------------|
| Scheduled Procedure Step | | | |
| Scheduled Procedure Step Sequence | (0040,0100) | R | |
| >Modality | (0008,0060) | R | “*” or <configured Modality> |
| >Scheduled Station AE Title | (0040,0001) | R | <own AET> or “*” ¹ |
| >Scheduled Procedure Step Start Date | (0040,0002) | R | Range from UI ² |
| >Scheduled Procedure Step Description | (0040,0007) | O | |
| >Scheduled Station Name | (0040,0010) | O | |
| >Scheduled Procedure Step Location | (0040,0011) | O | |
| >Scheduled Procedure Step Status | (0040,0020) | O | |
| >Scheduled Performing Physician's Name | (0040,0006) | O | |
| >Scheduled Protocol Code Sequence | (0040,0008) | O | |

¹ This depends on user configuration (Administration Portal->Technical Configuration->DICOM Nodes->Local DICOM Node->Worklist) if the “own AET” is provided or not.

² A time window can be configured by defining how many days to look into the past and into the future (Administration Portal-> Technical Configuration->DICOM Nodes->Local DICOM Node->Worklist)

| Attribute Name | Tag | Matching Key Type | Query Value |
|-----------------------------------|--------------|-------------------|-------------|
| >>Code Value | (0008,0100) | O | |
| Requested Procedure Description | (0032,1060) | O | |
| Requested Procedure Priority | (0040,1003) | O | |
| Patient Transport Arrangements | (0040,1004) | O | |
| Requested Procedure Comments | (0040,1400) | O | |
| Requested Procedure Code Sequence | (0032,1064) | O | |
| >Code Value | (0008,0100) | O | |
| Requesting Physician | (0032,1032) | O | |
| Referring Physicians Name | (0008,0090) | O | |
| Current Patient Location | (0038,0300) | O | |
| Pregnancy Status | (0010, 21C0) | O | |
| Medical Alerts | (0010,2000) | O | |
| Allergies | (0010,2110) | O | |

- Return Key Attributes of the Modality Worklist C-FIND

The **syngo.via** DICOM Modality Worklist SCU supports worklist queries with return key attributes of all types. The following tables describe the return keys that the SCU supports.

An “x” in the **UI** column will indicate that the attribute may be visualized when browsing the Worklist results with the Browser. The Browser display is additionally influenced by the related Browser configuration.

Table 4-24: Modality Worklist C-Find Return keys

| Attribute Name | Tag | Return Key Type | UI | Notes |
|--|-------------|-----------------|----|---|
| SOP Common | | | | |
| Specific Character Set | (0008,0005) | 1C | - | |
| Scheduled Procedure Step | | | | |
| Scheduled Procedure Step Sequence | (0040,0100) | 1 | | |
| >Modality | (0008,0060) | 1 | x | |
| >Scheduled Station AE Title | (0040,0001) | 1 | | “Scheduled Station AE Title” is taken as default for “Performed Station AE Title” |
| >Scheduled Procedure Step Start Date | (0040,0002) | 1 | - | |
| >Scheduled Procedure Step Start Time | (0040,0003) | 1 | - | |
| >Scheduled Procedure Step End Date | (0040,0004) | 3 | - | |
| >Scheduled Procedure Step End Time | (0040,0005) | 3 | - | |
| >Scheduled Performing Physician's Name | (0040,0006) | 1 | x | “Scheduled Performing Physician's Name” is taken as default for “Performing Physician's Name” |

| Attribute Name | Tag | Return Key Type | UI | Notes |
|---|-------------|-----------------|----|--|
| >Scheduled Procedure Step Description | (0040,0007) | 1C | x | "Scheduled Procedure Step Description" is taken as default for "Performed Procedure Step Description" |
| >Scheduled Protocol Code Sequence ** | (0040,0008) | 1C | - | Uses universal sequence match "Scheduled Protocol Code Sequence" is taken as default for "Performed Protocol Code Sequence" |
| >>Code Value | (0008,0100) | 1C | - | |
| >>Coding Scheme Designator | (0008,0102) | 1C | - | |
| >>Coding Scheme Version | (0008,0103) | 3 | - | |
| >>Code Meaning | (0008,0104) | 3 | - | |
| >Scheduled Procedure Step ID | (0040,0009) | 1 | x | "Scheduled Procedure Step ID" is taken as default for "Performed Procedure Step ID" |
| >Scheduled Station Name | (0040,0010) | 2 | x | |
| >Scheduled Procedure Step Location | (0040,0011) | 2 | - | "Scheduled Procedure Step Location" is taken as default for "Performed Location" |
| >Scheduled Procedure Step Status | (0040,0020) | 3 | - | |
| >Comments on the Scheduled Procedure Step | (0040,0400) | 3 | - | |
| Requested Procedure | | | | |
| Study Date | (0008,0020) | 3 | x | |
| Study Time | (0008,0030) | 3 | x | |
| Referenced Study Sequence ** | (0008,1110) | 2 | - | Uses universal sequence match |
| >Referenced SOP Class UID | (0008,1150) | 1C | - | |
| >Referenced SOP Instance UID | (0008,1155) | 1C | - | |
| Study Instance UID | (0020,000D) | 1 | - | |
| Requested Procedure Description | (0032,1060) | 1C | x | |
| Requested Procedure Code Sequence ** | (0032,1064) | 1C | - | Uses universal sequence match "Requested Procedure Code Sequence" is taken as default for "Procedure Code Sequence" |
| >Code Value | (0008,0100) | 1C | - | |
| >Coding Scheme Designator | (0008,0102) | 1C | - | |
| >Coding Scheme Version | (0008,0103) | 3 | - | |
| >Code Meaning | (0008,0104) | 3 | - | |
| Requested Procedure ID | (0040,1001) | 1 | x | "Requested Procedure ID" is taken as default for "Study ID" |
| Reason for the Requested Procedure | (0040,1002) | 3 | - | |
| Requested Procedure Priority | (0040,1003) | 2 | x | |
| Patient Transport Arrangements | (0040,1004) | 2 | - | |
| Confidentiality Code | (0040,1008) | 3 | - | |

| Attribute Name | Tag | Return Key Type | UI | Notes |
|---|-------------|-----------------|----|--|
| Reporting Priority | (0040,1009) | 3 | x | |
| Names of intended Recipients of Results | (0040,1010) | 3 | - | |
| Requested Procedure Comments | (0040,1400) | 3 | - | |
| Imaging Service Request | | | | |
| Accession Number | (0008,0050) | 2 | x | |
| Referring Physician's Name | (0008,0090) | 2 | x | |
| Requesting Physician | (0032,1032) | 2 | x | |
| Requesting Service | (0032,1033) | 3 | - | |
| Issuing Date of Imaging Service Request | (0040,2004) | 3 | - | |
| Issuing Time of Imaging Service Request | (0040,2005) | 3 | - | |
| Placer Order Number / Imaging Service Request * | (0040,2016) | 3 | - | Old tag (0040,2006) is retired and not used. |
| Filler Order Number / Imaging Service Request * | (0040,2017) | 3 | - | Old tag (0040,2007) is retired and not used. |
| Order entered by ... | (0040,2008) | 3 | - | |
| Order Enterer's location | (0040,2009) | 3 | - | |
| Order Callback Phone Number | (0040,2010) | 3 | - | |
| Imaging Service Request Comments | (0040,2400) | 3 | - | |
| Visit Identification | | | | |
| Admission ID | (0038,0010) | 2 | x | |
| Issuer of Admission ID | (0038,0011) | 3 | - | |
| Visit Status | | | | |
| Current Patient Location | (0038,0300) | 2 | x | |
| Visit Admission | | | | |
| Admitting Diagnosis Description | (0008,1080) | 3 | x | |
| Admitting Date | (0038,0020) | 3 | - | |
| Patient Identification | | | | |
| Patient's Name | (0010,0010) | 1 | x | |
| Patient ID | (0010,0020) | 1 | x | |
| Issuer of Patient ID | (0010,0021) | 3 | x | |
| Other Patient IDs | (0010,1000) | 3 | x | |
| Other Patient Names | (0010,1001) | 3 | x | |
| Patient's Birth Name | (0010,1005) | 3 | - | |
| Patient Demographic | | | | |
| Patient's Birth Date | (0010,0030) | 2 | x | |
| Patient's Birth Time | (0010,0032) | 3 | x | |
| Patient's Sex | (0010,0040) | 2 | x | |
| Patient's Insurance Plan Code Sequence ** | (0010,0050) | 3 | - | Uses universal sequence match |
| >Code Value | (0008,0100) | 1C | - | |
| >Coding Scheme Designator | (0008,0102) | 1C | - | |
| >Coding Scheme Version | (0008,0103) | 3 | - | |
| >Code Meaning | (0008,0104) | 3 | - | |
| Patient's Age | (0010,1010) | 3 | - | |
| Patient's Size | (0010,1020) | 3 | x | |
| Patient's Weight | (0010,1030) | 2 | x | |
| Patient's Address | (0010,1040) | 3 | x | |
| Military Rank | (0010,1080) | 3 | x | |
| Branch of Service | (0010,1081) | 3 | - | |
| Ethnic Group | (0010,2160) | 3 | x | |
| Patient Comments | (0010,4000) | 3 | x | |
| Patient Medical | | | | |
| Medical Alerts | (0010,2000) | 2 | x | |

| Attribute Name | Tag | Return Key Type | UI | Notes |
|----------------------------|-------------|-----------------|----|-------|
| Allergies | (0010,2110) | 2 | x | |
| Pregnancy Status | (0010,21C0) | 2 | x | |
| Smoking Status | (0010,21A0) | 3 | x | |
| Last Menstrual Date | (0010,21D0) | 3 | x | |
| Additional Patient History | (0010,21B0) | 3 | x | |
| Special Needs | (0038,0050) | 2 | x | |

The behavior of **syngo.via** when encountering status codes in a C-FIND response is summarized in Table 4-25:

Table 4-25: DICOM Command Response Status Handling Behavior

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|--|--------------------|------------------------------------|
| Error | e.g. Out of Resources; Cancellation; Identifier does not match SOP Class; Unable to process | Any none null Code | Failure reported to user |
| Pending | All optional keys are supported the same manner as Required Keys. | FF00 | Pending state is indicated to user |
| | Matching Operation continues; some of the optional keys were not supported the same way as the required keys | FF01 | Pending state is indicated to user |
| Success | Query has been performed successfully. | 0000 | Success reported to user |

Table 4-26: DICOM Command Communication Failure Behavior

| exception | Behavior |
|---------------------|---|
| Timeout | Failure reported to user (Timeout configurable; default 30s) |
| Association Aborted | Failure reported to user |

4.2.1.3.7 Activity “Printing to a Remote Node”

4.2.1.3.7.1 Description and Sequencing of Activities

Whenever a film-sheet is prepared by the user, it is forwarded to the Printer Job queue. As soon as the associated Printer device is available the job is activated and association is set up.

The film sheet is internally processed, converted to a Standard/1,1 page and then the page image is sent. Status is controlled by awaiting any N-EVENT-REPORT message all through the transfer until the last image or film-sheet is sent.

If the response from the remote application contains a status other than Success or Warning the printing is stopped and the job status is set to Aborted.

4.2.1.3.7.2 Proposed Presentation Contexts

Table 4-27: Proposed Presentation Contexts for Print

| Presentation Context Table | | | | | |
|---|------------------------|---------------------------|-------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Basic Grayscale Print Management Meta SOP Class | 1.2.840.10008.5.1.1.9 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Basic Color Print Management Meta SOP Class | 1.2.840.10008.5.1.1.18 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Print Job SOP Class | 1.2.840.10008.5.1.1.14 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| Presentation LUT SOP Class | 1.2.840.10008.5.1.1.23 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |

4.2.1.3.7.3 SOP Specific Conformance Statement for Print SOP classes

The **syngo.via** Print SCU conforms to the DICOM Basic Grayscale Print Management Meta SOP Class and the Basic Color Print Management Meta SOP Class.

The application uses a configuration platform to define the properties of the connected DICOM SCP, e.g.:

- supported film sizes of the connected DICOM SCP
- supported film formats of the DICOM SCP

The printing is only suspended in the case of a failure return status of the SCP.

The command communication failure behavior for the following subchapters is identical. So it has been put as only one table to this position:

Table 4-28: DICOM Command Communication Failure Behavior

| exception | Behavior |
|---------------------|---|
| Timeout | Failure reported to user (Timeout configurable; default 30s) |
| Association Aborted | Failure reported to user |

4.2.1.3.7.3.1 Basic Film Session SOP Class

The Basic Film Session information object definition describes all the user-defined parameters, which are common for all the films of a film session. The Basic Film Session refers to one or more Basic Film Boxes that are printed on one hardcopy printer.

The **syngo.via** Print Management SCU supports the following DIMSE Service elements for the Basic Film Session SOP Class as SCU:

- N-CREATE
- N-DELETE

The Basic Film Session SOP Class N-CREATE-RQ (SCU) uses the attributes listed in the table below:

Table 4-29: Attributes of N-Create-Request of Basic Film Session

| Attribute Name | Tag | Usage SCU | Supported Values |
|------------------|-------------|-----------|------------------|
| Number of Copies | (2000,0010) | U | 1 |
| Medium Type | (2000,0030) | U | BLUE FILM |
| | | | CLEAR FILM |
| | | | PAPER |
| | | | MAMMO BLUE FILM |
| | | | MAMMO CLEAR FILM |

The number of Copies sent to the DICOM Printer is always 1, a number higher than 1 is not supported in this version.

The Affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and used for later requests (e.g. N-DELETE-RQ) on the Basic Film Session.

The N-DELETE-RQ on the Basic Film Session SOP Class is used to remove the complete Basic Film Session SOP Instance hierarchy.

The Basic Film Session SOP class interprets the status codes (from N-CREATE-RSP messages) listed in the table below:

Table 4-30: N-CREATE-RSP Status Handling Behavior

| Service Status | Further Meaning | Error Codes | Behavior |
|----------------|-----------------------------------|-------------|--|
| Warning | Memory Allocation not supported | B600 | Print job continues, warning is logged |
| Success | Film session successfully created | 0000 | Print job continues |

4.2.1.3.7.3.2 Basic Film Box SOP Class

The Basic Film Box information object definition describes all the user-defined parameter of one film of the film session. The Basic Film Box information description defines the presentation parameters, which are common for all images on a given sheet of film.

The Basic Film Box refers to one or more Image Boxes.

Supported Service Elements as SCU are:

- N-CREATE
- N-ACTION
- N-DELETE

The Basic Film Box SOP Class N-CREATE-RQ message uses the attributes listed below. The actual values for each attribute depend on DICOM printer configuration within the **syngo.via** DICOM Print Management SCU:

Table 4-31: Attributes for N-CREATE-RQ of Basic Film Box

| Attribute Name | Tag | Usage SCU | Supported Values |
|--|-------------|-----------|--|
| Image Display Format | (2010,0010) | M | STANDARD\,R |
| Referenced Film Session Sequence | (2010,0500) | M | |
| > Referenced SOP Class UID | (0008,1150) | M | 1.2.840.10008.5.1.1.1 |
| > Referenced SOP Instance UID | (0008,1155) | M | |
| Film Orientation | (2010,0040) | M | PORTRAIT, LANDSCAPE |
| Film Size ID | (2010,0050) | M | 8INX10IN, 10INX12IN, 10INX14IN, 11INX14IN,, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM |
| Magnification Type | (2010,0060) | M | BILINEAR, CUBIC, NONE, REPLICATE |
| Border Density | (2010,0100) | U | BLACK, WHITE |
| Max Density | (2010,0130) | U | 0 < Value |
| Min Density | (2010,0120) | U | 0 < Value < 50 |
| Required if Presentation LUT is present | | | |
| Reflective Ambient Light | (2010,0160) | U | 0 < Value |
| Illumination | (2010,015E) | U | 0 < Value |
| Referenced Presentation LUT Sequence | (2050,0500) | U | |

For Page Mode printing, the Image Display format used is Standard\1,1.

The N-CREATE-RSP message from the Print SCP includes the Referenced Image Box Sequence with SOP Class/Instance UID pairs which will be kept internally to be further used for the subsequent Basic Image Box SOP Class N-SET-RQ messages.

When all Image Boxes (including parameters) for the film-sheet have been set, the **syngo.via** print manager will issue a N-ACTION-RQ message with the SOP Instance UID of the Basic Film Box and the Action Type ID of 1.

The affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and used for later requests (e.g. N-DELETE-RQ) on the Basic Film Box.

The Basic Film Box SOP class interprets the status codes listed in the table below:

Table 4-32: N-CREATE-RSP Response Status Handling Behavior for Basic Film Box SOP Class

| Service Status | Meaning | Error Codes | Behavior |
|----------------|---|-------------|--|
| Failure | There is an existing Film Box that has not been printed and N-ACTION at the Film Session level is not supported. A new Film Box will not be created when a previous Film Box has not been printed | C616 | Print job is marked as failed and the reason is logged |
| 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 | Print job continues and warning is logged |
| Success | Film Box successfully created | 0000 | Print job continues |

Table 4-33: N-ACTION Response Status Handling Behavior for Basic Film Box SOP Class

| Service Status | Meaning | Error Codes | Behavior |
|----------------|---|-------------|--|
| Failure | Unable to create print job, print queue is full | C602 | Print job is marked as failed and the reason is logged |
| | Image size is larger than images box size | C603 | Print job is marked as failed and the reason is logged |
| | Combined Print Image size is larger than the Image Box size | C613 | Print job is marked as failed and the reason is logged |
| Warning | Film box does not contain image box (empty page) | B603 | Print job continues and warning is logged |
| | Image size is larger than image box size, the image has been demagnified | B604 | Print job continues and warning is logged |
| | Image size is larger than the Image Box size. The Image has been cropped to fit. | B609 | Print job continues and warning is logged |
| | Image size or Combined Print Image size is larger than the Image Box size. Image or Combined Print Image has been decimated to fit. | B60A | Print job continues and warning is logged |
| Success | Film accepted for printing | 0000 | Print job continues |

4.2.1.3.7.3.3 Basic Grayscale Image Box SOP Class

The Basic Grayscale Image Box information object definition is the presentation of an image and image related data in the image area of a film. The Basic Image Box information describes the presentation parameters and image pixel data, which apply to a single image of a sheet of film. The Grayscale Image Box SOP Class uses only the N-SET-RQ with the attributes listed in the table below:

Table 4-34: Attributes for N-SET-RQ of Basic Grayscale Image Box

| Attribute Name | Tag | Usage SCU | Supported Values |
|--------------------------------|-------------|-----------|------------------|
| Image Position | (2020,0010) | M | 1 |
| Basic Grayscale Image Sequence | (2020,0110) | M | |
| > Samples per Pixel | (0028,0002) | M | 1 |
| > Photometric Interpretation | (0028,0004) | M | MONOCHROME2 |
| > Rows | (0028,0010) | M | |
| > Columns | (0028,0011) | M | |
| > Pixel Aspect Ratio | (0028,0034) | M | |
| > Bits Allocated | (0028,0100) | M | 8,16 |
| > Bits Stored | (0028,0101) | M | 8,12 |
| > High Bit | (0028,0102) | M | 7,11 |
| > Pixel Representation | (0028,0103) | M | 0 |
| > Pixel Data | (7FE0,0010) | M | |

The Grayscale Image Box SOP class interprets the status codes as listed below:

Table 4-35: DICOM Command Response Status Handling Behavior for Basic Grayscale Image Box SOP Class

| Service Status | Further Meaning | Error Codes | Behavior |
|----------------|---|-------------|--|
| Failure | Image contains more pixel than printer can print in Image Box | C603 | Print job is marked as failed and the reason is logged |
| | Insufficient memory in printer to store the image | C605 | Print job is marked as failed and the reason is logged |
| | Combined Print Image size is larger than the Image Box size | C613 | Print job is marked as failed and the reason is logged |
| Warning | Image size is larger than image box size, the image has been demagnified. | B604 | Print job continues and the reason is logged |
| | Requested MinDensity or MaxDensity outside of Printer's operating range | B605 | Print job continues and the reason is logged |
| | Image size is larger than the Image Box size. The Image has been cropped to fit. | B609 | Print job continues and warning is logged |
| | Image size or Combined Print Image size is larger than the Image Box size. Image or Combined Print Image has been decimated to fit. | B60A | Print job continues and warning is logged |
| Success | Image successfully stored in Image Box | 0000 | Print job continues |

4.2.1.3.7.3.4 Basic Color Image Box SOP Class

The Basic Color Image Box information object definition is the presentation of an image and image related data in the image area of a film. The Basic Image Box information describes the presentation parameters and image pixel data, which apply to a single image of a sheet of film.

The Color Image Box SOP Class uses only the N-SET-RQ with the attributes listed below:

Table 4-36: Attributes for N-SET-RQ of Basic Color Image Box

| Attribute Name | Tag | Usage SCU | Supported Values |
|------------------------------|-------------|-----------|------------------|
| Image Position | (2020,0010) | M | 1 |
| BASIC Color Image Sequence | (2020,0111) | M | |
| > Samples per Pixel | (0028,0002) | M | 3 |
| > Photometric Interpretation | (0028,0004) | M | RGB |
| > Planar Configuration | (0028,0006) | M | 0 |
| > Rows | (0028,0010) | M | |
| > Columns | (0028,0011) | M | |
| > Pixel Aspect Ratio | (0028,0034) | M | |
| > Bits Allocated | (0028,0100) | M | 8 |
| > Bits Stored | (0028,0101) | M | 8 |
| > High Bit | (0028,0102) | M | 7 |
| > Pixel Representation | (0028,0103) | M | 0 |
| > Pixel Data | (7FE0,0010) | M | |

The Color Image Box SOP class interprets the status codes listed below:

Table 4-37: DICOM Command Response Status Handling Behavior for Basic Color Image Box SOP Class

| Service Status | Meaning | Error Codes | Behavior |
|----------------|---|-------------|--|
| Failure | Image contains more pixel than printer can print in Image Box | C603 | Print job is marked as failed and the reason is logged |
| | Insufficient memory in printer to store the image | C605 | Print job is marked as failed and the reason is logged |
| | Combined Print Image size is larger than the Image Box size | C613 | Print job is marked as failed and the reason is logged |
| Warning | Image size larger than image box size | B604 | Print job continues and the reason is logged |
| | Image size is larger than the Image Box size. The Image has been cropped to fit. | B609 | Print job continues and warning is logged |
| | Image size or Combined Print Image size is larger than the Image Box size. Image or Combined Print Image has been decimated to fit. | B60A | Print job continues and warning is logged |
| Success | Image successfully stored in Image Box | 0000 | Print job continues |

4.2.1.3.7.3.5 *Presentation LUT SOP Class*

The objective of the Presentation LUT is to realize image hardcopy printing tailored for specific modalities, applications and user preferences.

The output of the Presentation LUT is Presentation Values (P-Values). P-Values are approximately related to human perceptual response. They are intended to facilitate common input for hardcopy. P-Values are intended to be independent of the specific class or characteristics of the hardcopy device.

The Presentation LUT SOP Class uses only the N-CREATE-RQ with the attributes listed below:

Table 4-38: Attributes for N-CREATE-RQ of Presentation LUT SOP Class

| Attribute Name | Tag | Usage SCU | Supported Values |
|------------------------|-------------|-----------|------------------|
| Presentation LUT Shape | (2050,0020) | U | IDENTITY |

The affected SOP Instance UID received with N-CREATE-RSP message will be kept internally and is used for later requests on the Basic Film Box (N-CREATE-RQ) and on the Presentation LUT (N-DELETE-RQ).

The Presentation LUT SOP class interprets the status codes listed below:

Table 4-39: DICOM Command Response Status Handling Behavior for Presentation LUT SOP Class

| Service Status | Further Meaning | Error Codes | Behavior |
|----------------|--|-------------|--|
| Warning | Requested MinDensity or MaxDensity outside of HCD's operating range. HCD will use its respective minimum or maximum density value instead. | B605 | Print job continues and the reason is logged |
| Success | Presentation LUT successfully created | 0000 | Print job continues |

4.2.1.3.7.3.6 *Printer SOP Class*

The Printer SOP Class is the possibility to monitor the status of the hardcopy printer in a synchronous and in an asynchronous way.

The SCU uses the mandatory N-EVENT-REPORT DIMSE service to monitor the changes of the printer status in an asynchronous way.

It can directly ask the Printer (SCP) for its status or receive Events from the Printer asynchronously:

- N-GET as SCU
- N-EVENT-REPORT as SCU

In both cases the information listed in the two following tables is supported:

Table 4-40: Used Printer N-EVENT-REPORT-RQ attributes

| Event-type Name | Event | Attributes | Tag | Usage SCU |
|-----------------|-------|---------------------|-------------|-----------|
| Normal | 1 | - | - | - |
| Warning | 2 | Printer Status Info | (2110,0020) | U |
| Failure | 3 | Printer Status Info | (2110,0020) | U |

Table 4-41: Used Printer N-GET-RSP attributes

| Attribute Name | Tag | Usage SCP | Supported Values |
|---------------------|-------------|-----------|---|
| Printer Status | (2110,0010) | M | NORMAL, FAILURE, WARNING |
| Printer Status Info | (2110,0020) | M | See table in chapter 8.6 possible values. |

4.2.1.3.7.3.7 Print Job SOP Class

The Print Job SOP Class is the possibility to monitor the execution of the print process.

The **syngo.via** DICOM Print Management application supports the optional N-EVENT-REPORT DIMSE Service to receive the changes of the Print Job Status in an asynchronous way. It can receive Events from the Print SCP asynchronously.

Note: The **syngo.via** DICOM Print Management application does not support receiving N-EVENT-REPORT requests from the camera during print sessions. Normally this is configurable in the camera. Refer to Table 4-42: Used Print Job N-EVENT-REPORT attributes for the N-EVENT-REPORT attributes the **syngo.via** DICOM Print Management application can handle.

Table 4-42: Used Print Job N-EVENT-REPORT attributes

| Event-type Name | Event | Attributes | Tag | Usage SCU |
|-----------------|-------|-----------------------|-------------|--|
| Pending | 1 | Execution Status Info | (2100,0030) | U |
| | | Print Job ID | (2100,0010) | -- (Print Queue Management SOP Class not supported) |
| | | Film Session Label | (2000,0050) | U |
| | | Printer Name | (2110,0030) | U |
| Printing | 2 | Execution Status Info | (2100,0030) | U |
| | | Print Job ID | (2100,0010) | -- (Print Queue Management SOP Class not supported) |

| Event-type Name | Event | Attributes | Tag | Usage SCU |
|-----------------|-------|-----------------------|-------------|---|
| | | Film Session Label | (2000,0050) | U |
| | | Printer Name | (2110,0030) | U |
| Done | 3 | Execution Status Info | (2100,0030) | U |
| | | Print Job ID | (2100,0010) | -- (Print Queue Management SOP Class not supported) |
| | | Film Session Label | (2000,0050) | U |
| | | Printer Name | (2110,0030) | U |
| Failure | 4 | Execution Status Info | (2100,0030) | U |
| | | Print Job ID | (2100,0010) | -- (Print Queue Management SOP Class not supported) |
| | | Film Session Label | (2000,0050) | U |
| | | Printer Name | (2110,0030) | U |

4.2.1.4 Association Acceptance Policy

The **syngo.via** attempts to accept a new association for

- DIMSE C-STORE
- DIMSE N-ACTION (Storage Commitment)
- DIMSE C-MOVE
- DIMSE C-FIND
- DIMSE N-CREATE (UPS Create Workitem)

service operations.

Generally associations are accepted if all of the following conditions are true:

- The "called AET" matches one of the configured Application Entity Titles of the **syngo.via**.
- The "calling AET" is known (configured) at **syngo.via**. This check can be disabled.
- The maximum number of incoming associations is not reached.
- At least one Presentation Context with a minimum of one suitable transfer syntax has been proposed as defined by the "Presentation Context Tables" in the following subsections.
- The system has enough available resources to perform the service requested (e.g. enough free disk space, less than the max. number of associations are already in use)

4.2.1.4.1 Activity “Receive Instances”**4.2.1.4.1.1 Description and Sequencing of Activities**

The **syngo.via** receiving process will accept an association, receive any objects transmitted on that association and store the objects on disk.

4.2.1.4.1.2 Accepted Presentation Contexts

For all supported Transfer objects (see SOP Classes in Table 8-1) the Transfer Syntaxes described in Table 4-5 are supported.

Generally all Presentation Contexts are accepted as long as they contain at least one suitable Transfer Syntax. All other Presentation Contexts are rejected.

There is no Extended Negotiation as an SCP

4.2.1.4.1.3 SOP-specific Conformance Statement for Storage SOP classes

The **syngo.via** conforms to the Full Storage Class at Level 2.

In case of a successful C-STORE operation, the image has successfully been written on disk either in Explicit Little Endian format or in the compression format received.

The Storage AE of the **syngo.via** returns the status “success” when the data is stored to disk and a minimal image header validation has been performed.

The following header attributes must be available and filled:

- SOP Class UID,
- Study Instance UID,
- Series Instance UID and
- SOP Instance UID.

Table 4-43: Storage C-STORE Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|-----------------------------------|------------|---|
| Success | success | 0000 | Image received correctly (success notification is done after receiving, before indexing and storing) |
| Failure | Out-of-resource | A700 | No resource left in the Short Term Storage |
| Failure | Unable to Process | Cxxx | Error during instance reception |
| Failure | Data set does not match SOP Class | A9xx | The data set is not conform to the SOP Class contained in the resource. |

Restriction: successful operation does not guarantee storage of header data in the database.

4.2.1.4.1.4 Other SOP specific behavior

- If an image is received that is already stored in the database - identified by the SOP Instance UID - the new image will be ignored. The existing instance is not superseded.

4.2.1.4.2 Activity “Receive Initial Storage Commitment Request”

4.2.1.4.2.1 Description and Sequencing of Activities

When receiving an initial Storage Commitment request (N-ACTION-RQ) the **syngo.via** will accept it with an N-ACTION-RSP and trigger a check in the database for the required instances.

The subsequently issued N-EVENT-REPORT-RQ will always be sent in a second association.

syngo.via will store SOP instances indefinitely unless the instances are manually deleted by a user or automatically by a watermark system, if the images have been routed to a PACS and the PACS committed the images back to **syngo.via**. The manual deletion may lead to deletion of acknowledged instances before archiving to PACS has happened.

4.2.1.4.2.2 Accepted Presentation Contexts

Table 4-44: Acceptable Presentation Contexts for Storage Commitment and Activity “Receive Commitment Request”

| Presentation Context Table | | | | | |
|-------------------------------|----------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

4.2.1.4.2.3 SOP-Specific Conformance Statement for SC SOP classes

There are only 2 different return status codes for the commitment request itself. They indicate only whether the request was successfully received or not. The real response is sent via N-EVENT-REPORT-RQ either on the same or on a different association.

Success or failure of Storage Commitment will be signaled via the N-EVENT-REPORT primitive.

The SCU is responsible for creating a unique Transaction UID. The SCP will not check, whether the UID is already in use or not.

Table 4-45: Storage Commitment N-EVENT-REPORT Response Status

| Service Status | Further Meaning | Error Codes | Reason |
|----------------|-----------------------------------|-------------|---|
| Success | success | 0000 | Image received correctly (success notification is done after receiving, before indexing and storing) |
| Failure | Unable to Process | Cxxx | Error during instance reception |
| Failure | Data set does not match SOP Class | A9xx | The data set is not conform to the SOP Class contained in the resource. |

4.2.1.4.3 Activity “Receive Instance Retrieve Requests”

4.2.1.4.3.1 Description and Sequencing of Activities

The **syngo.via** responds to requests issued by an SCU with the query model Patient Root, Study Root and Patient/Study Only.

Hierarchical and relational retrieve operations are both supported.

4.2.1.4.3.2 Accepted Presentation Contexts

The **syngo.via** will accept Presentation Contexts as shown in Table 4-46.

Table 4-46: Acceptable Presentation Contexts Activity “Receive Instance Retrieve Request”

| Presentation Context Table | | | | | |
|---|-----------------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Patient Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | Yes |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| Study Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | Yes |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| Patient/Study Only Query/ Retrieve Information Model – FIND | 1.2.840.10008.5.1.4.1.2.3.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | No |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

Table 4-47: Extended Negotiation as an SCP

| SOP Class Name | SOP Class UID | Extended Negotiation |
|--|-----------------------------|--|
| Patient Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Relational Query will be negotiated if necessary as defined in DICOM PS3.4 |
| Study Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Relational Query will be negotiated if necessary as defined in DICOM PS3.4 |

4.2.1.4.3.3 SOP Specific Conformance Statement to Query SOP classes

The **syngo.via** Query AE supports all Query attributes of Table 4-48.

Table 4-48: Attributes supported for instance Query SCP

| Attribute Name | Tag | Type | Matching |
|--|-------------|------|-----------------------|
| Patient Level¹ | | | |
| Patient's Name | (0010,0010) | O | wildcard ² |
| Patient ID | (0010,0020) | O | wildcard |
| Patient's Birth Date | (0010,0030) | O | universal (Null) |
| Patient's Birth Time | (0010,0032) | O | universal (Null) |
| Patient's Sex | (0010,0040) | O | universal (Null) |
| Issuer of Patient ID | (0010,0021) | O | wildcard |
| Other Patient Names | (0010,1001) | O | - |
| Other Patient IDs | (0010,1000) | O | - |
| Ethnic Group | (0010,2160) | O | - |
| Military Rank | (0010,1080) | O | - |
| Patient's Address | (0010,1040) | O | - |
| Patient Comments | (0010,4000) | O | - |
| Medical Alerts | (0010,2000) | O | - |
| Contrast Allergies | (0010,2110) | O | - |
| Smoking Status | (0010,21A0) | O | - |
| Pregnancy Status | (0010,21C0) | O | - |
| Last Menstrual Date | (0010,21D0) | O | - |
| Special Needs | (0038,0050) | O | - |
| Confidentiality Constraint on Patient Data Description | (0040,3001) | O | - |
| Study Level³ | | | |
| Patient's Name | (0010,0010) | O | wildcard ² |
| Patient ID | (0010,0020) | O | wildcard |
| Patient's Birth Date | (0010,0030) | O | universal (Null) |
| Patient's Birth Time | (0010,0032) | O | universal (Null) |
| Patient's Sex | (0010,0040) | O | universal (Null) |

| Attribute Name | Tag | Type | Matching |
|--|-------------|------|------------------|
| Issuer of Patient ID | (0010,0021) | O | wildcard |
| Other Patient Names | (0010,1001) | O | - |
| Other Patient IDs | (0010,1000) | O | - |
| Ethnic Group | (0010,2160) | O | - |
| Military Rank | (0010,1080) | O | - |
| Patient's Address | (0010,1040) | O | - |
| Patient Comments | (0010,4000) | O | - |
| Medical Alerts | (0010,2000) | O | - |
| Contrast Allergies | (0010,2110) | O | - |
| Smoking Status | (0010,21A0) | O | - |
| Pregnancy Status | (0010,21C0) | O | - |
| Last Menstrual Date | (0010,21D0) | O | - |
| Special Needs | (0038,0050) | O | - |
| Confidentiality Constraint on Patient Data Description | (0040,3001) | O | - |
| Patient's Size | (0010,1020) | O | - |
| Patient's Weight | (0010,1030) | O | - |
| Additional Patient History | (0010,21B0) | O | - |
| Accession Number | (0008,0050) | O | wildcard |
| Study ID | (0020,0010) | O | wildcard |
| Study Instance UID | (0020,000D) | U | universal (Null) |
| Study Date | (0008,0020) | O | universal (Null) |
| Study Time | (0008,0030) | O | universal (Null) |
| Study Comments | (0032,4000) | O | wildcard |
| Name of Physician (s) Reading Study | (0008,1060) | O | wildcard |
| Referring Physician's Name | (0008,0090) | O | wildcard |
| Study Description | (0008,1030) | O | wildcard |
| Number of Study related Instances | (0020,1208) | O | universal (Null) |
| Modalities in Study | (0008,0061) | O | universal (Null) |
| Admitting Diagnosis Description | (0008,1080) | O | - |
| Patient's Institution Residence | (0038,0400) | O | - |
| Admission ID | (0038,0010) | O | - |
| Requesting Physician | (0032,1032) | O | wildcard |
| Number of Study Related Series | (0020,1206) | O | universal (Null) |
| Series Level | | | |
| Modality | (0008,0060) | O | universal (Null) |
| Series Date | (0008,0021) | O | universal (Null) |
| Series Time | (0008,0031) | O | universal (Null) |
| Number of Series related Instances | (0020,1209) | O | universal (Null) |
| Series Number | (0020,0011) | O | universal (Null) |

| Attribute Name | Tag | Type | Matching |
|---|---------------------------|------|------------------|
| Series Description | (0008,103E) | O | wildcard |
| Institutional Department Name | (0008,1040) | O | wildcard |
| Request Attributes Sequence \ Requested Procedure ID | (0040,0275) \ (0040,1001) | O | wildcard |
| Request Attributes Sequence \ Scheduled Procedure Step ID | (0040,0275) \ (0040,0009) | O | wildcard |
| Performed Procedure Step Start Date | (0040,0244) | O | universal (Null) |
| Performed Procedure Step Start Time | (0040,0245) | O | universal (Null) |
| Series Instance UID | (0020,000E) | U | universal (Null) |
| Manufacturer's Model Name | (0008,1090) | O | wildcard |
| Patient Position | (0018,5100) | O | - |
| Station Name | (0008,1010) | O | wildcard |
| Institution Name | (0008,0080) | O | wildcard |
| Institution Address | (0008,0081) | O | wildcard |
| Performing Physician's Name | (0008,1050) | O | wildcard |
| Operators' Name | (0008,1070) | O | - |
| Body Part Examined | (0018,0015) | O | universal (Null) |
| Protocol Name | (0018,1030) | O | wildcard |
| Laterality | (0020,0060) | O | - |
| Frame of Reference UID | (0020,0052) | O | - |
| Manufacturer | (0008,0070) | O | - |
| Device Serial Number | (0018,1000) | O | - |
| Series Type | (0054,1000) | O | - |
| Counts Source | (0054,1002) | O | - |
| Corrected Image | (0028,0051) | O | - |
| Units | (0054,1001) | O | - |
| Instance Level | | | |
| Instance Number | (0020,0013) | O | universal (Null) |
| Image Type | (0008,0008) | O | - |
| Instance Creation Date | (0008,0012) | O | - |
| Instance Creation Time | (0008,0013) | O | - |
| Acquisition Date | (0008,0022) | O | universal (Null) |
| Acquisition Time | (0008,0032) | O | universal (Null) |
| Slice Location | (0020,1041) | O | - |
| Content Date | (0008,0023) | O | - |
| Content Time | (0008,0033) | O | - |
| SOP Class UID | (0008,0016) | O | universal (Null) |
| SOP Instance UID | (0008,0018) | U | universal (Null) |
| Retrieve AE Title | (0008,0054) | O | - |
| Source AE Title | (0002,0016) | O | - |
| Acquisition Number | (0020,0012) | O | - |

| Attribute Name | Tag | Type | Matching |
|--|------------------------------|------|------------------|
| Rows | (0028,0010) | O | - |
| Columns | (0028,0011) | O | - |
| Bits Allocated | (0028,0100) | O | - |
| Number of Frames | (0028,0008) | O | - |
| Slice Thickness | (0018,0050) | O | universal (Null) |
| Instance Availability | (0008,0056) | O | - |
| Image Comments | (0020,4000) | O | - |
| Treatment Date | (3008,0250) | O | - |
| Treatment Time | (3008,0251) | O | - |
| Calibration Image | (0050,0004) | O | - |
| Image Laterality | (0020,0062) | O | - |
| Patient Orientation | (0020,0020) | O | - |
| Contrast/Bolus Total Dose | (0018,1044) | O | - |
| Image Position (Patient) | (0020,0032) | O | - |
| Image Orientation (Patient) | (0020,0037) | O | - |
| Data Collection Center (Patient) | (0018,9313) | O | - |
| Reconstruction Target Center (Patient) | (0018,9318) | O | - |
| Contrast/Bolus Agent | (0018,0010) | O | - |
| KVP | (0018,0060) | O | - |
| Gantry/Detector Tilt | (0018,1120) | O | - |
| Convolution Kernel | (0018,1210) | O | - |
| Exposure Time | (0018,1150) | O | - |
| Acquisition Duration | (0018,9073) | O | - |
| Exposure | (0018,1152) | O | - |
| Single Collimation Width | (0018,9306) | O | - |
| CT Exposure Sequence \ CTDIvol | (0018,9321) \ (0018,9345) | O | - |
| Acquisition Datetime | (0008,002A) | O | - |
| Contrast/Bolus Agent Sequence \ Code Value | (0018,0012) \ (0008,0100) | O | - |
| Contrast/Bolus Agent Sequence \ Coding Scheme Designator | (0018,0012) \ (0008,0102) | O | - |
| Contrast/Bolus Agent Sequence \ Coding Scheme Version | (0018,0012) \ (0008,0103) | O | - |
| Contrast/Bolus Agent Sequence \ Code Meaning | (0018,0012) \ (0008,0104) | O | - |
| Repetition Time | (0018,0080) | O | - |
| Echo Time | (0018,0081) | O | - |
| Inversion Time | (0018,0082) | O | - |
| Trigger Time | (0018,1060) | O | - |
| MR Diffusion Sequence \ Diffusion b-value | (0018,9117) \ (0018,9087) | O | - |

- 1 - Patient Root Information Model only
- 2 - Always a "*" is appended to the user-supplied string
- 3 - Study Root Information Model only

The query attribute contents will be treated case-insensitive.
Wildcards (*, ?) will not replace component and component group separators (^, =).

For attributes with PN value representation the following components (from all three component group) are used for matching: family name complex, given name complex and middle name. Universal matching is applied for PN components.

Regardless of extended negotiation, **syngo.via** does not consider the value of time zone offset from UTC(0008,0201) to adjust values of time attributes from the local time zone to UTC for matching.

Single value matching of date and time is performed by meaning. For example:

- TM "2230" matches values:

"2230", "223000", from "223000." to "223059.999999" including all values extended with trailing zeros (e.g. "223000.500").

Range matching of date and time is performed by meaning. For example:

- TM "21-224010" matches values:

"21", "2100", "210000", from "210000." to "224010.999999" including all values extended with trailing zeros (e.g. "224010.500").

Regardless of extended negotiation of combined date time matching, a pair of attributes that are a date and a time, both of which specify the same form of range matching, will have the concatenated string values of each range matching component matched as if they were a single date time attribute.

For example, a Study Date of "20060705-20060707" and a Study Time of "1000-1800" will match the time period of July 5, 10am until July 7, 6pm, rather than the three time periods of 10am until 6pm on 1225 each of July 5, July 6 and July 7, as would be the case without extended negotiation.

In case of combined date time matching the time condition also matches with undefined/null time values.

The Query AE of the **syngo.via** does not return any Media File-Set ID or UID, they always return the Retrieve AET (0008,0054). Furthermore, "Instance Availability" (0008,0056) is always returned.

Enterprise Query:

It is possible to group several **syngo.via** systems in an "Enterprise Group" (via configuration). A special Query SCP AET is available which spans the Query to the complete Enterprise Group. This AET is automatically created and has always the following syntax: "<Hostname>_E", where <Hostname> is the AET of the corresponding **syngo.via** server, automatically shortened to 14 characters in order to keep the total AET length beneath 16 char (DICOM Conformance). A Query sent to this AET will return all matching attributes present in all **syngo.via** systems configured in the Enterprise Group. The returned Retrieve AET allows to retrieve the instances directly from the **syngo.via** storing them.

4.2.1.4.3.4 Hierarchical and Relational Queries

Independent of the negotiation for relational queries, each C-FIND request is treated as if it was a relational query. The SCP allows any combination of keys at or above the provided Query/Retrieve level in the hierarchy. Keys below Query/Retrieve level return an error.

But if for example a series level attribute is requested in a study level query, an error will be returned by **syngo.via** (code "0106").

4.2.1.4.3.5 Return Codes

Table 4-49: Query C-FIND / C-CANCEL Response Status

| Service Status | Further Meaning | Error Codes | Reason |
|----------------|--|-------------|---|
| Failure | Parsing or translation of the DICOM request failed. A response could not be generated. The response could not be sent to the SCU. The query of the database failed. | C001 | Any error during Query in the DataBase |
| Success | Matching is complete - No final Identifier is supplied | 0000 | |
| Pending | Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys | FF00 | Further Items will be returned; |
| Pending | Matches are continuing – Warning that one or more Optional Keys were not supported for existence and/or matching for this identifier | FF01 | Further Items will be returned; Some of Required Attributes are not present in the DataBase |

The maximum number of matches returned can be configured. The status of the final response will always be SUCCESS whether the clipping occurred or not.

4.2.1.4.4 Activity "Move SCP"

4.2.1.4.4.1 Description and Sequencing of Activities

The Retrieve AE responds to retrieve requests of an SCU. The requests are used to retrieve the referenced images. The Retrieve AE supports the query model Study Root.

4.2.1.4.4.2 Accepted Presentation Contexts

Table 4-50: Acceptable Presentation Contexts for Retrieve and Activity “MOVE SCP”

| Presentation Context Table | | | | | |
|--|-----------------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Study Root Query/Retrieve Model – MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | No |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| Patient Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | No |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |
| Patient/Study Only Query/ Retrieve Information Model – MOVE | 1.2.840.10008.5.1.4.1.2.3.2 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | No |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

4.2.1.4.4.3 SOP Specific Conformance Statement for Move SCP Classes

At association establishment time the C-MOVE presentation context shall be negotiated. When the C-MOVE-RQ is processed, the Move Destination attribute (receiver of images) is ignored. However the Move Destination AE must conform to the DICOM conventions (value representation AE).

The Retrieve AE sends continuously C-MOVE responses to indicate progress about the de-archiving of images. The C-MOVE-RSP contains the Service parameters listed in Table 4-51.

Table 4-51: C-MOVE-RSP Service Parameters

| Attribute | Meaning |
|-----------------------------------|--|
| Number of Remaining Sub-Operation | Is sent if the C-MOVE-RSP has the status Pending. Indicates the number of images which have not yet been sent. |
| Number of Completed Sub-Operation | Indicates the number of images which were sent. |
| Number of Failed Sub-Operation | Number of failing images within the Sending Association (C-STORE) |
| Number of Warning Sub-Operation | Always 0. |

The final C-MOVE-RSP is sent after all images have been de-archived either successfully or unsuccessfully.

4.2.1.4.4.4 Return Codes

Table 4-52: Retrieve C-MOVE Response Status

| Service Status | Further Meaning | Error Code | Reason |
|----------------|-----------------------------------|------------|--|
| Success | success | 0000 | Image received correctly (success notification is done after receiving, before indexing and storing) |
| Failure | Out-of-resource | A700 | Not resource left in the Short Term Storage |
| Failure | Unable to Process | Cxxx | Error during instance reception |
| Failure | Data set does not match SOP Class | A9xx | The data set is not conforming to the SOP Class contained in the resource. |

4.2.1.4.5 Activity “Create Workitem”

4.2.1.4.5.1 Description and Sequencing of Activities

The **syngo.via** responds to requests issued by an SCU with create new workitem request (N-CREATE-RQ).

4.2.1.4.5.2 Accepted Presentation Contexts

Table 4-53: Acceptable Presentation Contexts Activity “Create Workitem”

| Presentation Context Table | | | | | |
|-------------------------------|----------------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Unified Procedure Step - Push | 1.2.840.10008.5.1.4.34.6.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

4.2.1.4.5.3 SOP specific Conformance for UPS Push SOP classes

The behavior of **syngo.via** when encountering status codes in an N-CREATE-RSP response is summarized in Table 4-54:

Table 4-54: UPS Push N-CREATE Response Status Handling Behavior

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|--|--------------------|--------------------------|
| Failure | Workitem creation request could not be processed. | Any none null Code | Workitem is not created. |
| Success | Workitem with empty transaction UID is created with “SCHEDULED” state. | 0000 | Workitem is created. |

4.2.1.4.6 Activity “Cancel Workitem”**4.2.1.4.6.1 Description and Sequencing of Activities**

The **syngo.via** sends cancel workitem (N-ACTION-RQ) in order to cancel a workflow.

4.2.1.4.6.2 Accepted Presentation Contexts**Table 4-55: Acceptable Presentation Contexts Activity “Cancel Workitem”**

| Presentation Context Table | | | | | |
|-------------------------------|----------------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Unified Procedure Step - Push | 1.2.840.10008.5.1.4.34.6.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

4.2.1.4.6.3 SOP specific Conformance for UPS Push SOP classes

The behavior of **syngo.via** when encountering status codes in an N-ACTION-RSP response is summarized in Table 4-56:

Table 4-56: UPS Push N-ACTION Response Status Handling Behavior

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|----------------------------|--------------------|----------------------------|
| Error | Cancel Workflow failed. | Any none null Code | Workflow is not cancelled. |
| Success | Cancel Workflow succeeded. | 0000 | Workflow cancelled. |

4.2.1.4.7 Activity “Create MPPS”**4.2.1.4.7.1 Description and Sequencing of Activities**

The **syngo.via** sends N-CREATE-RQ request to inform the Information System that the performance of the Procedure Step has been started.

4.2.1.4.7.2 Accepted Presentation Contexts**Table 4-57: Acceptable Presentation Contexts Activity “Create MPPS”**

| Presentation Context Table | | | | | |
|-----------------------------------|-------------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Modality Performed Procedure Step | 1.2.840.10008.3.1.2.3.3 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

4.2.1.4.7.3 SOP specific Conformance for MPPS SOP class

The behavior of **syngo.via** when encountering status codes in an N-CREATE-RSP response is summarized in Table 4-58:

Table 4-58: MPPS N-CREATE Response Status Handling Behavior

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|---|--------------------|----------------------|
| Failure | MPPS creation request could not be processed. | Any none null Code | MPPS is not created. |
| Success | MPPS creation request processed successfully. | 0000 | MPPS is created. |

4.2.1.4.8 Activity “Update MPPS”**4.2.1.4.8.1 Description and Sequencing of Activities**

The **syngo.via** sends N-SET request inform the Information System about the finalization of the Procedure Step(completed or discontinued).

4.2.1.4.8.2 Accepted Presentation Contexts

Table 4-59: Acceptable Presentation Contexts Activity “Update MPPS”

| Presentation Context Table | | | | | |
|-----------------------------------|-------------------------|---------------------------|---------------------|------|-----------|
| Abstract Syntax | | Transfer Syntax | | Role | Ext. Neg. |
| Name | UID | Name List | UID List | | |
| Modality Performed Procedure Step | 1.2.840.10008.3.1.2.3.3 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | | |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | | |

4.2.1.4.8.3 SOP specific Conformance for MPPS SOP class

The behavior of **syngo.via** when encountering status codes in an N-SET-RSP response is summarized in Table 4-60:

Table 4-60: MPPS N-SET Response Status Handling Behavior

| Service Status | Further Meaning | Error Code | Behavior |
|----------------|---|--------------------|----------------------|
| Failure | MPPS update request could not be processed. | Any none null Code | MPPS is not updated. |
| Success | MPPS update request could processed successfully. | 0000 | MPPS is updated. |

NETWORK INTERFACES

4.2.2 Physical Network Interface

The **syngo.via** provides DICOM 3.0 TCP/IP network communication support as defined in Part 8 of [1]. The network communication is independent from the physical medium over which TCP/IP executes; it inherits this from the Windows OS system upon which it executes.

4.2.3 Additional Protocols

none

4.2.4 IPv4 and IPv6 Support

IPv4 and IPv6 are supported. Regarding IPv6 please note, that the complete networking infrastructure in the hospital (firewalls, DNS-Servers, ...) must support IPv6 in order to get a functioning communication.

4.3 CONFIGURATION

4.3.1 AE Title/Presentation Address Mapping

AE Titles shall be unique within the hospital. A common way to achieve that is to use the hostname as part of the AE Titles. The string can be up to 16 characters and must not contain any extended characters. Only 7-bit ASCII characters (excluding Control Characters) are allowed according to DICOM [1].

4.3.1.1 Local AE Titles

The **syngo.via** allows to configure AETitles, Ports and Services in any wished way. Default delivery is that all services are using the same AE title and only one port number. In case the connected systems cannot handle this default, the customer service engineer is able to configure for each service its own AE title and Port number.

| Parameter | Configurable | Default Value |
|------------------|--------------|--|
| Default AE title | Yes | hostname in uppercase characters; limited to 16 characters |
| Default Port | Yes | 104 |

4.3.1.2 Remote AE Title/Presentation Address Mapping

4.3.1.2.1 Remote Association Initiators

All relevant remote applications that may setup DICOM associations towards **syngo.via** need to be configured in **syngo.via**, before the association can be established. This behavior is configurable but it is recommended, not to change this behavior.

The mapping of external AE Titles to TCP/IP addresses and ports is configurable and initially set at the time of installation by Installation Personnel. Changes can later on also be performed by the local system administrator. The Application Entity Titles and supported transfer syntaxes need to be known for configuration.

To enable a fast and efficient configuration possibility Siemens will deliver templates for known configuration examples, so that the behavior (usage of one AE title, default port numbers, supported services) is determined already through the template.

Remote Application Entities can be configured without restarting the process.

4.3.1.2.2 Remote SCP's

For remote applications that shall be able to accept DICOM associations from **syngo.via**, the following information needs to be available:

- Application Entity Title
- Host Name / IP address on which the remote application service runs
- Port number on which the remote application accepts association requests.

The remote system will be indicated in the UI of **syngo.via** with a logical name, that is also entered when configuring the node in the administration UI.

To enable a fast and efficient configuration possibility Siemens will deliver templates for known configuration examples, so that the behavior (usage of one AE title, default port numbers, supported services) is determined already through the template.

Remote Application Entities can be configured without restarting the process.

4.3.2 Parameters

The next table lists configuration parameters, which are true for all Application Entities.

Table 4-61: Parameter List

| Parameter | Configurable | Default Value |
|--|--------------|---------------|
| max PDU size | Yes | 32768 Bytes |
| time-out for accepting/rejecting an association request | Yes | 30 s |
| time-out for responding to an association open/close request | Yes | 30 s |
| time-out for accepting a message over network | Yes | 30 s |
| time-out for waiting for data between TCP/IP-packets | Yes | 5 s |
| time-outs for waiting for a Service Request/Response message from the remote node (Storage SCP/SCU) | Yes | 30 s |
| time-outs for waiting for a Service Request/Response message from the remote node (Query/Retrieve SCP/SCU) | Yes | 30 s |
| time-out for waiting for a C-MOVE-RSP | No | 1200 s |
| number of image collection before saving to database | Yes | 20 |
| max matches query limit | Yes | 100 |
| max number of parallel receiving associations | Yes | 12 |

5 MEDIA INTERCHANGE

5.1 IMPLEMENTATION MODELS

5.1.1 Application Data Flow Diagram

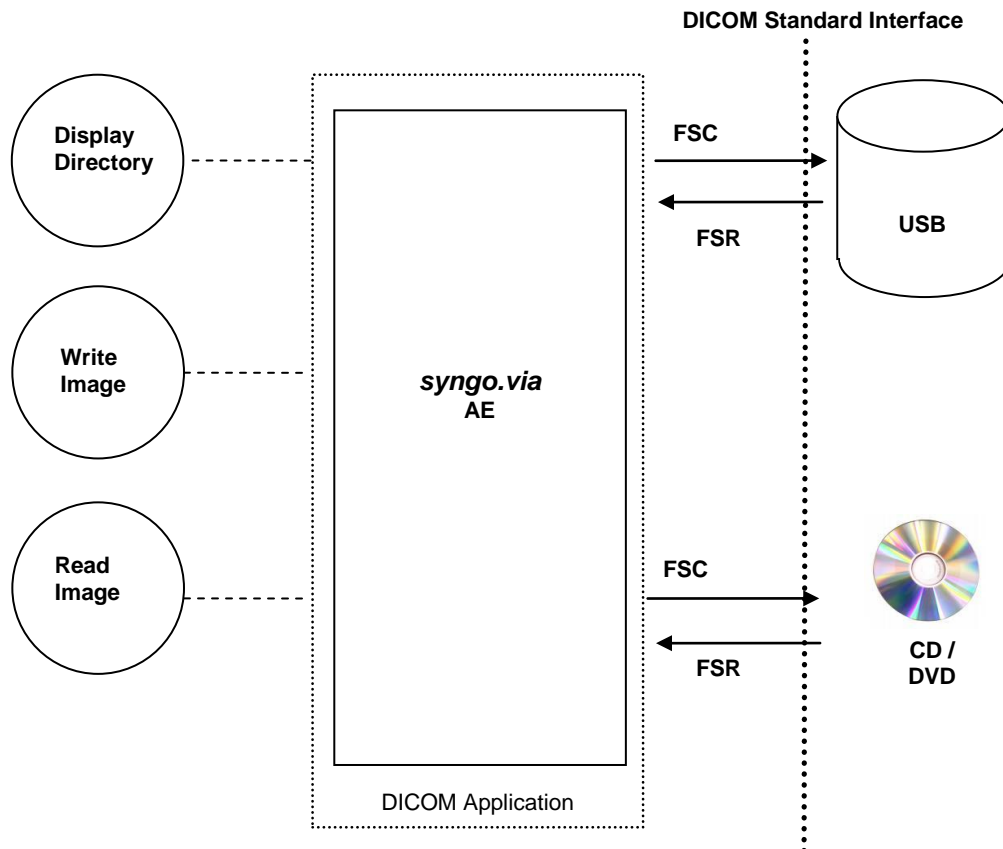


Figure 5.1-1: Media Interchange Application Data Flow Diagram

The **syngo.via** provides the functionality to Import or Export DICOM Instances from and to the File System. During export, a DICOMDIR may also be generated (user selection). A complete ISO Image ready-to-burn can also be generated. All SOP Classes defined in Table 5-3 and Table 5-4 are supported for the Import/Export functionality.

5.1.2 Functional definitions of AEs

The **syngo.via** application is capable of

- creating a new File-set in the File System (Export to ...)

- importing SOP Instances from the medium onto local storage
- writing the File-sets DICOMDIR information into the file system and joining it to an ISO image.

5.1.3 Sequencing of Real-World Activities

Whenever data is written to an external media, **syngo.via** creates a DICOMDIR from the selected data and creates an ISO image of the selected data on the local hard disk. Depending on the selected data and options (selected media size, with or without compression) either General Purpose CD profile or DVD-J2K profile are used.

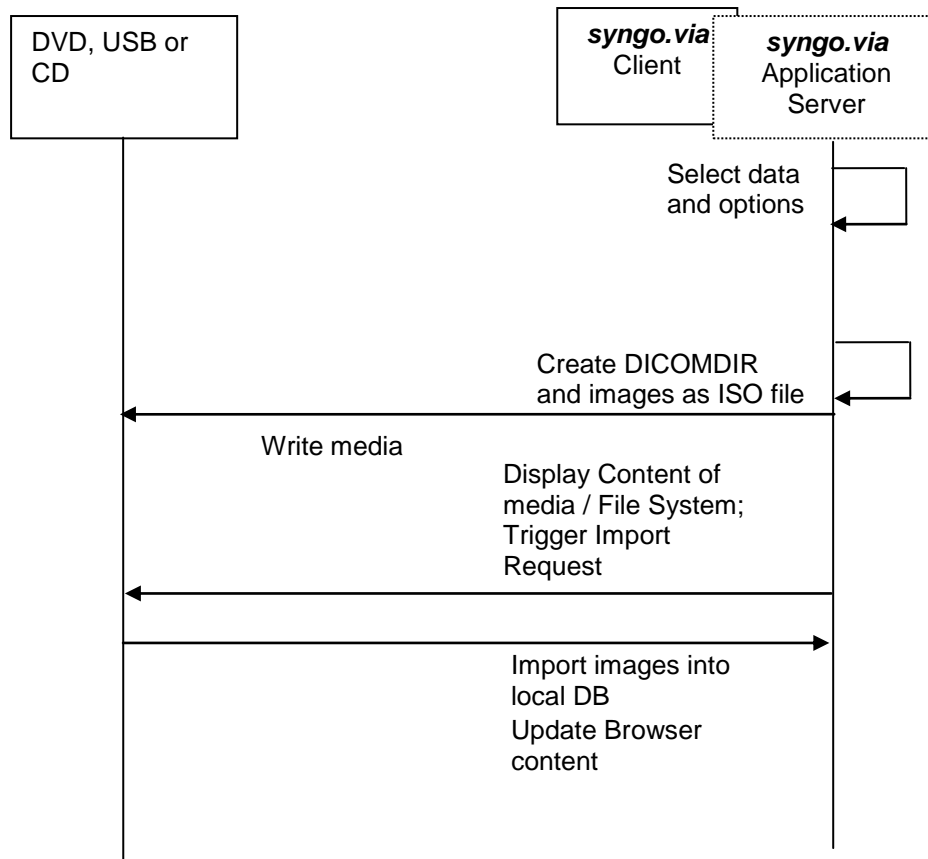


Figure 5.1-2: Sequence diagram – Media creation

5.1.4 File Meta Information for Implementation Class and Version

This section describes the values assigned to the File Meta Information attributes (see [1]part 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 the same as the values specified for networking.

Table 5-1: Implementation Class/Version Name - Media Interchange

| | |
|-------------------------------|----------------------------------|
| File Meta Information Version | 0001 |
| Implementation Class UID | 1.3.12.2.1107.5.8.15.10.20090701 |
| Implementation Version Name | syngo.via |

5.2 AE SPECIFICATIONS

5.2.1 Media Storage AE – Specification

The **syngo.via** provides conformance to the following Application Profiles as an FSC as well as an FSR. FSU is supported only on a non-optical storage device (e.g. USB stick).

In addition augmented conformance is provided to store extra data attributes important for the full feature support of the **syngo@**-based products. Details are listed below:

Table 5-2: Media - Application Profiles and Real-World Activities

| Application Profiles Supported | Real-World Activity | Role | Service Class Option |
|--------------------------------|--|--------------------|----------------------|
| AUG-GEN-CD | Browse Directory Information Import into Application Export to local Archive Media | FSR , FSC , FSU | Interchange |
| AUG-GEN-DVD | | | |
| AUG- GEN-DVD-J2K | | | |
| AUG- GEN-USB-J2K | | | |
| STD-GEN-CD | Browse Directory Information Import into Application Export to local Archive Media | FSR , FSC , FSU | Interchange |
| STD-GEN-DVD | | | |
| STD-GEN-DVD-J2K | | | |
| STD-GEN-USB-J2K | | | |

5.2.1.1 File Meta Information for **syngo.via**

5.2.1.2 Real-World Activities

5.2.1.2.1 Activity “Browse Directory Information”

The **syngo.via** acts as FSR using the interchange option when requested to read the media directory.

The **syngo.via** will read the DICOMDIR and insert those directory entries that are valid for the application profiles supported, into a local database. The database then is used for browsing media contents.

Note: The “Icon Image Sequence” is also supported in DICOMDIR. But only those Icon Images with “Bits Allocated” (0028,0100) equal to 8 and size of 64x64 or 128x128 pixels are imported into database and are visible in the Browser.

5.2.1.2.1.1 Media Storage Application Profiles

See Table 5-2 for the Application Profiles listed that invoke this Application Entity for the Browse Directory Information

5.2.1.2.2 Activity “Import into Application”

The **syngo.via** application acts as FSR using the interchange option when requested to read SOP Instances from the medium into the application.

The SOP Instance selected from the media directory will be copied into the running Application. Only SOP Instances, that are valid for the application profile supported and supported by **syngo.via** (see Table 8-1), can be retrieved from media.

5.2.1.2.3 Real-World Activity “Export to local Archive Media”

The **syngo.via** application acts as FSU (for media with existing DICOM file-set) or FSC (media not initialized) using the interchange option when requested to copy SOP Instances from the local storage to local Archive Medium. The activity as FSU is only possible as long as the local burning SW of **syngo.via Client** has not already processed the generated ISO file.

The **syngo.via** application will receive a list of SOP Instances to be copied to the local archive medium. Depending on the profile selected (Standard: uncompressed, with DICOMDIR; Patient: compressed with DICOMDIR) the SOP Instances will be taken and an ISO file is being generated that includes the DICOMDIR and the corresponding objects.

It is then up to **syngo.via Client** local configuration (if equipped with a local media burner) to burn the ISO file to the appropriate media.

5.2.1.2.4 Media Storage Application Profiles

See Table 5-2 for the Application Profiles listed that invoke this Application Entity for the local Archive Media Real-World Activity.

5.2.1.3 SOP Classes and Transfer Syntaxes

These Application Profiles are based on the Media Storage Service Class with the Interchange Option. In the table below (Table 5-3) the Transfer Syntax UID “RLE Lossless” only applies for decompression.

Table 5-3: SOP Classes and Transfer Syntaxes for STD-GEN-DVD-J2K and STD-GEN-USB-J2K

| Information Object Definition | SOP Class UID | Transfer Syntax UID |
|--|--------------------------------|---|
| Basic Directory | 1.2.840.10008.1.3.10 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Basic Text Structured Report Storage | 1.2.840.10008.5.1.4.1.1.88.11 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Blending Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.4 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Breast Tomosynthesis Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 JPEG Lossless Process 14 (selection value 1) |

| Information Object Definition | SOP Class UID | Transfer Syntax UID |
|--|-------------------------------|--|
| | | 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Color Softcopy Presentation State Storage (store & forward only) | 1.2.840.10008.5.1.4.1.1.11.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Comprehensive SR | 1.2.840.10008.5.1.4.1.1.88.33 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| CR Image | 1.2.840.10008.5.1.4.1.1.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| CT image | 1.2.840.10008.5.1.4.1.1.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| Deformable Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| DX Image – For Presentation | 1.2.840.10008.5.1.4.1.1.1.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| MG Image – For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless |

| Information Object Definition | SOP Class UID | Transfer Syntax UID |
|---------------------------------|--------------------------------|---|
| | | 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| MG Image – For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | |
| | | |
| Encapsulated PDF | 1.2.840.10008.5.1.4.1.1.104.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Enhanced CT Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | |
| | | |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | |
| | | |
| Enhanced MR Color Image Storage | 1.2.840.10008.5.1.4.1.1.4.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | |
| | | |
| Enhanced Structured Report | 1.2.840.10008.5.1.4.1.1.88.22 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Enhanced XA Image Storage | 1.2.840.10008.5.1.4.1.1.12.1.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | |
| | | |
| Enhanced XRF Image Storage | 1.2.840.10008.5.1.4.1.1.12.2.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless |
| | | |

| Information Object Definition | SOP Class UID | Transfer Syntax UID |
|---------------------------------------|-------------------------------|---|
| | | 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| General ECG Waveform | 1.2.840.10008.5.1.4.1.1.9.1.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Grayscale Softcopy Presentation State | 1.2.840.10008.5.1.4.1.1.11.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Hemodynamic Waveform | 1.2.840.10008.5.1.4.1.1.9.2.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Key Object Selection Document | 1.2.840.10008.5.1.4.1.1.88.59 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Mammography CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.50 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | |
| Multi-frame Grayscale Byte SC Image | 1.2.840.10008.5.1.4.1.1.7.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | |
| Multi-frame Grayscale Word SC Image | 1.2.840.10008.5.1.4.1.1.7.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | |
| Multi-frame Single Bit SC Image | 1.2.840.10008.5.1.4.1.1.7.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | |
| Multi-frame True Color SC Image | 1.2.840.10008.5.1.4.1.1.7.4 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) |

| Information Object Definition | SOP Class UID | Transfer Syntax UID |
|--|-------------------------------|--|
| | | 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) |
| | | 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless |
| | | 1.2.840.10008.1.2.5 |
| NM Image | 1.2.840.10008.5.1.4.1.1.20 | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | Explicit VR Little Endian Uncompressed |
| | | 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) |
| | | 1.2.840.10008.1.2.4.70 |
| PET Image | 1.2.840.10008.5.1.4.1.1.128 | RLE Lossless |
| | | 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | Explicit VR Little Endian Uncompressed |
| | | 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) |
| Procedure Log | 1.2.840.10008.5.1.4.1.1.88.40 | 1.2.840.10008.1.2.4.70 |
| | | RLE Lossless |
| | | 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | Explicit VR Little Endian Uncompressed |
| | | 1.2.840.10008.1.2.1 |
| Pseudo-Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.3 | Explicit VR Little Endian Uncompressed |
| Raw Data | 1.2.840.10008.5.1.4.1.1.66 | 1.2.840.10008.1.2.1 |
| | | Explicit VR Little Endian Uncompressed |
| | | 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) |
| | | 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) |
| | | 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| Real World Value Mapping | 1.2.840.10008.5.1.4.1.1.67 | RLE Lossless |
| | | 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | Explicit VR Little Endian Uncompressed |
| | | 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) |
| | | 1.2.840.10008.1.2.4.70 |
| RT Beams Treatment Record | 1.2.840.10008.5.1.4.1.1.481.4 | JPEG Lossy (baseline or extended) |
| | | 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless |
| | | 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | Explicit VR Little Endian Uncompressed |
| RT Dose | 1.2.840.10008.5.1.4.1.1.481.2 | 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) |
| | | 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) |
| | | 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless |
| | | 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | Explicit VR Little Endian Uncompressed |
| | | 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) |
| | | 1.2.840.10008.1.2.4.70 |

| Information Object Definition | SOP Class UID | Transfer Syntax UID |
|-------------------------------|-------------------------------|---|
| RT Image | 1.2.840.10008.5.1.4.1.1.481.1 | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| RT Ion Beams Treatment Record | 1.2.840.10008.5.1.4.1.1.481.9 | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| RT Ion Plan | 1.2.840.10008.5.1.4.1.1.481.8 | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| RT Plan | 1.2.840.10008.5.1.4.1.1.481.5 | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| RT Structure Set | 1.2.840.10008.5.1.4.1.1.481.3 | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| RT Treatment Summary Record | 1.2.840.10008.5.1.4.1.1.481.7 | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| Secondary Capture Image | 1.2.840.10008.5.1.4.1.1.7 | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| | | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |

| Information Object Definition | SOP Class UID | Transfer Syntax UID |
|----------------------------------|------------------------------|---|
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| Surface Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.5 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Ultrasound Image (retired) | 1.2.840.10008.5.1.4.1.1.6 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| Ultrasound Image | 1.2.840.10008.5.1.4.1.1.6.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| Ultrasound Multi-frame (retired) | 1.2.840.10008.5.1.4.1.1.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 |

| Information Object Definition | SOP Class UID | Transfer Syntax UID |
|--|--------------------------------|---|
| | | 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| Ultrasound Multi-frame Image | 1.2.840.10008.5.1.4.1.1.3.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| X-Ray 3D Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.1 | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| X-Ray Angiographic Image | 1.2.840.10008.5.1.4.1.1.12.1 | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |
| X-Ray Radiation Dose Structured Report Storage | 1.2.840.10008.5.1.4.1.1.88.67 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| X-Ray Radiofluoroscopic Image | 1.2.840.10008.5.1.4.1.1.12.2 | JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70 |
| | | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| | | JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 |
| | | RLE Lossless 1.2.840.10008.1.2.5 |
| | | JPEG 2000 Lossless 1.2.840.10008.1.2.4.90 |
| | | JPEG 2000 Lossy 1.2.840.10008.1.2.4.91 |

Table 5-4: SOP Classes and Transfer Syntaxes for STD-GEN-CD and STD-GEN-DVD Profile

| Information Object Definition | SOP Class UID | Transfer Syntax UID |
|--|--------------------------------|---|
| Basic Directory | 1.2.840.10008.1.3.10 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Basic Text Structured Report Storage | 1.2.840.10008.5.1.4.1.1.88.11 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Blending Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.4 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Breast Tomosynthesis Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |

| Information Object Definition | SOP Class UID | Transfer Syntax UID |
|--|--------------------------------|---|
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Color Softcopy Presentation State Storage (store & forward only) | 1.2.840.10008.5.1.4.1.1.11.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Comprehensive SR | 1.2.840.10008.5.1.4.1.1.88.33 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| CR Image | 1.2.840.10008.5.1.4.1.1.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| CT Image | 1.2.840.10008.5.1.4.1.1.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Deformable Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| DX Image – For Processing | 1.2.840.10008.5.1.4.1.1.1.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| DX Image – For Presentation | 1.2.840.10008.5.1.4.1.1.1.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| MG Image – For Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| MG Image – For Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Encapsulated PDF | 1.2.840.10008.5.1.4.1.1.104.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Enhanced CT Image | 1.2.840.10008.5.1.4.1.1.2.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Enhanced MR Color Image Storage | 1.2.840.10008.5.1.4.1.1.4.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Enhanced Structured Report | 1.2.840.10008.5.1.4.1.1.88.22 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Enhanced XA Image Storage | 1.2.840.10008.5.1.4.1.1.12.1.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Enhanced XRF Image Storage | 1.2.840.10008.5.1.4.1.1.12.2.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| General ECG Waveform | 1.2.840.10008.5.1.4.1.1.9.1.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Grayscale Softcopy Presentation State | 1.2.840.10008.5.1.4.1.1.11.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Hemodynamic Waveform | 1.2.840.10008.5.1.4.1.1.9.2.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Key Object Selection Document | 1.2.840.10008.5.1.4.1.1.88.59 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Mammography CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.50 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Multi-frame Grayscale Byte SC Image | 1.2.840.10008.5.1.4.1.1.7.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Multi-frame Grayscale Word SC Image | 1.2.840.10008.5.1.4.1.1.7.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Multi-frame Single Bit SC Image | 1.2.840.10008.5.1.4.1.1.7.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Multi-frame True Color SC Image | 1.2.840.10008.5.1.4.1.1.7.4 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| NM Image | 1.2.840.10008.5.1.4.1.1.20 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Pseudo-Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| PET Image | 1.2.840.10008.5.1.4.1.1.128 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Procedure Log | 1.2.840.10008.5.1.4.1.1.88.40 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Raw Data | 1.2.840.10008.5.1.4.1.1.66 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Real World Value Mapping | 1.2.840.10008.5.1.4.1.1.67 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| RT Beams Treatment Record | 1.2.840.10008.5.1.4.1.1.481.4 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |

| Information Object Definition | SOP Class UID | Transfer Syntax UID |
|--|--------------------------------|---|
| RT Dose | 1.2.840.10008.5.1.4.1.1.481.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| RT Image | 1.2.840.10008.5.1.4.1.1.481.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| RT Ion Beams Treatment Record | 1.2.840.10008.5.1.4.1.1.481.9 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| RT Ion Plan | 1.2.840.10008.5.1.4.1.1.481.8 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| RT Plan | 1.2.840.10008.5.1.4.1.1.481.5 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| RT Structure Set | 1.2.840.10008.5.1.4.1.1.481.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| RT Treatment Summary Record | 1.2.840.10008.5.1.4.1.1.481.7 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Secondary Capture Image | 1.2.840.10008.5.1.4.1.1.7 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Surface Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.5 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Ultrasound Image (retired) | 1.2.840.10008.5.1.4.1.1.6 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Ultrasound Image | 1.2.840.10008.5.1.4.1.1.6.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Ultrasound Multi-frame (retired) | 1.2.840.10008.5.1.4.1.1.3 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| Ultrasound Multi-frame Image | 1.2.840.10008.5.1.4.1.1.3.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| X-Ray 3D Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| X-Ray Angiographic Image | 1.2.840.10008.5.1.4.1.1.12.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| X-Ray Radiation Dose Structured Report Storage | 1.2.840.10008.5.1.4.1.1.88.67 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |
| X-Ray Radiofluoroscopic Image | 1.2.840.10008.5.1.4.1.1.12.2 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 |

5.3 AUGMENTED AND PRIVATE APPLICATION PROFILES

5.3.1 Augmented Application Profiles

The standard application profiles are augmented with private object Siemens CSA Non-Image.

Table 5-5: Private SOP Classes and Transfer Syntaxes for Augmented Media Profiles

| Information Object Definition | SOP Class UID | Transfer Syntax UID | FSC | FSR |
|-------------------------------|---------------------|---|-----|-----|
| CSA Non-Image Storage | 1.3.12.2.1107.5.9.1 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 | O | M |

The Siemens non-image is typically used for raw data and 3D private data.

5.4 MEDIA CONFIGURATION

none

5.5 ATTRIBUTE CONFIDENTIALITY PROFILES

5.5.1 De-identification

The **syngo.via** application can de-identify attributes using three different levels. During export to filesystem it is the user responsibility to select the appropriate anonymization level. For full and reduced anonymization private attributes are not included in anonymized Studies. For service anonymization all private attributes are included in anonymized Studies.

Note : reduced anonymization applies the following options : Retain UIDs , Patient Chars, Long Full Dates

In the following table for attributes marked with:

- 'Yes' - data are anonymized
- 'No' - data are kept

Table 5-6: Application Level Confidentiality Profile Attributes

| DICOM Tag | Attribute Name | Full | Reduced | Service |
|-------------|--|------|---------|---------|
| (0000,1000) | Affected SOP Instance UID | Yes | No | No |
| (0000,1001) | Requested SOP Instance UID | Yes | No | No |
| (0002,0003) | Media Storage SOP Instance UID | Yes | No | No |
| (0004,1511) | Referenced SOP Instance UID in File | Yes | No | No |
| (0008,0014) | Instance Creator UID | Yes | No | No |
| (0008,0015) | Instance Coercion DateTime | Yes | No | No |
| (0008,0018) | SOP Instance UID | Yes | No | Yes |
| (0008,0020) | Study Date | Yes | No | No |
| (0008,0021) | Series Date | Yes | No | No |
| (0008,0022) | Acquisition Date | Yes | No | No |
| (0008,0023) | Content Date | Yes | No | No |
| (0008,0024) | Overlay Date | Yes | No | No |
| (0008,0025) | Curve Date | Yes | No | No |
| (0008,002A) | Acquisition DateTime | Yes | No | No |
| (0008,0030) | Study Time | Yes | No | No |
| (0008,0031) | Series Time | Yes | No | No |
| (0008,0032) | Acquisition Time | Yes | No | No |
| (0008,0033) | Content Time | Yes | No | No |
| (0008,0034) | Overlay Time | Yes | No | No |
| (0008,0035) | Curve Time | Yes | No | No |
| (0008,0050) | Accession Number | Yes | Yes | No |
| (0008,0058) | Failed SOP Instance UID List | Yes | No | No |
| (0008,0080) | Institution Name | Yes | Yes | No |
| (0008,0081) | Institution Address | Yes | Yes | No |
| (0008,0082) | Institution Code Sequence | Yes | Yes | No |
| (0008,0090) | Referring Physician's Name | Yes | Yes | Yes |
| (0008,0092) | Referring Physician's Address | Yes | Yes | Yes |
| (0008,0094) | Referring Physician's Telephone Numbers | Yes | Yes | Yes |
| (0008,0096) | Referring Physician's Identification Sequence | Yes | Yes | No |
| (0008,010D) | Context Group Extension Creator UID | Yes | No | No |
| (0008,0201) | Timezone Offset From UTC | Yes | No | No |
| (0008,1010) | Station Name | Yes | Yes | Yes |
| (0008,1030) | Study Description | Yes | Yes | No |
| (0008,103E) | Series Description | Yes | Yes | No |
| (0008,1040) | Institutional Department Name | Yes | Yes | No |
| (0008,1048) | Physician(s) of Record | Yes | Yes | Yes |
| (0008,1049) | Physician(s) of Record Identification Sequence | Yes | Yes | No |
| (0008,1050) | Performing Physicians' Name | Yes | Yes | Yes |
| (0008,1052) | Performing Physicians' Identification Sequence | Yes | Yes | No |

| DICOM Tag | Attribute Name | Full | Reduced | Service |
|-------------|---|------|---------|---------|
| (0008,1060) | Name of Physician(s) Reading Study | Yes | Yes | Yes |
| (0008,1062) | Physician Reading Study Identification Sequence | Yes | Yes | No |
| (0008,1070) | Operators' Name | Yes | Yes | Yes |
| (0008,1072) | Operators' Identification Sequence | Yes | Yes | No |
| (0008,1080) | Admitting Diagnoses Description | Yes | Yes | No |
| (0008,1084) | Admitting Diagnoses Code Sequence | Yes | Yes | No |
| (0008,1110) | Referenced Study Sequence | Yes | No | No |
| (0008,1111) | Referenced Performed Procedure Step Sequence | Yes | No | No |
| (0008,1120) | Referenced Patient Sequence | Yes | Yes | No |
| (0008,1140) | Referenced Image Sequence | Yes | No | No |
| (0008,1155) | Referenced SOP Instance UID | Yes | No | No |
| (0008,1195) | Transaction UID | Yes | No | No |
| (0008,2111) | Derivation Description | Yes | Yes | No |
| (0008,2112) | Source Image Sequence | Yes | No | No |
| (0008,3010) | Irradiation Event UID | Yes | No | No |
| (0008,4000) | Identifying Comments | Yes | Yes | No |
| (0008,9123) | Creator Version UID | Yes | No | No |
| (0010,0010) | Patient's Name | Yes | Yes | Yes |
| (0010,0020) | Patient ID | Yes | Yes | Yes |
| (0010,0021) | Issuer of Patient ID | Yes | Yes | No |
| (0010,0030) | Patient's Birth Date | Yes | Yes | No |
| (0010,0032) | Patient's Birth Time | Yes | Yes | No |
| (0010,0040) | Patient's Sex | Yes | No | No |
| (0010,0050) | Patient's Insurance Plan Code Sequence | Yes | Yes | No |
| (0010,0101) | Patient's Primary Language Code Sequence | Yes | Yes | No |
| (0010,0102) | Patient's Primary Language Modifier Code Sequence | Yes | Yes | No |
| (0010,1000) | Other Patient IDs | Yes | Yes | Yes |
| (0010,1001) | Other Patient Names | Yes | Yes | Yes |
| (0010,1002) | Other Patient IDs Sequence | Yes | Yes | No |
| (0010,1005) | Patient's Birth Name | Yes | Yes | Yes |
| (0010,1010) | Patient's Age | Yes | No | No |
| (0010,1020) | Patient's Size | Yes | No | No |
| (0010,1030) | Patient's Weight | Yes | No | No |
| (0010,1040) | Patient Address | Yes | Yes | Yes |
| (0010,1050) | Insurance Plan Identification | Yes | Yes | No |
| (0010,1060) | Patient's Mother's Birth Name | Yes | Yes | Yes |
| (0010,1080) | Military Rank | Yes | Yes | No |
| (0010,1081) | Branch of Service | Yes | Yes | No |
| (0010,1090) | Medical Record Locator | Yes | Yes | No |
| (0010,1100) | Referenced Patient Photo Sequence | Yes | Yes | No |
| (0010,2000) | Medical Alerts | Yes | Yes | No |
| (0010,2110) | Allergies | Yes | Yes | No |
| (0010,2150) | Country of Residence | Yes | Yes | No |
| (0010,2152) | Region of Residence | Yes | Yes | No |
| (0010,2154) | Patient's Telephone Number | Yes | Yes | Yes |
| (0010,2160) | Ethnic Group | Yes | No | No |
| (0010,2180) | Occupation | Yes | Yes | No |
| (0010,21A0) | Smoking Status | Yes | No | No |
| (0010,21B0) | Additional Patient's History | Yes | Yes | Yes |
| (0010,21C0) | Pregnancy Status | Yes | No | No |
| (0010,21D0) | Last Menstrual Date | Yes | No | No |
| (0010,21F0) | Patient's Religious Preference | Yes | Yes | No |
| (0010,2203) | Patient Sex Neutered | Yes | No | No |
| (0010,2297) | Responsible Person | Yes | Yes | No |
| (0010,2299) | Responsible Organization | Yes | Yes | No |
| (0010,4000) | Patient Comments | Yes | Yes | Yes |
| (0018,0010) | Contrast Bolus Agent | Yes | Yes | No |
| (0018,1000) | Device Serial Number | Yes | Yes | No |
| (0018,1002) | Device UID | Yes | No | No |
| (0018,1004) | Plate ID | Yes | Yes | No |
| (0018,1005) | Generator ID | Yes | Yes | No |
| (0018,1007) | Cassette ID | Yes | Yes | No |
| (0018,1008) | Gantry ID | Yes | Yes | No |
| (0018,1030) | Protocol Name | Yes | Yes | No |
| (0018,1400) | Acquisition Device Processing Description | Yes | Yes | No |
| (0018,2042) | Target UID | Yes | No | No |
| (0018,4000) | Acquisition Comments | Yes | Yes | No |
| (0018,700A) | Detector ID | Yes | Yes | No |
| (0018,9424) | Acquisition Protocol Description | Yes | Yes | No |
| (0018,9516) | Start Acquisition DateTime | Yes | No | No |

| DICOM Tag | Attribute Name | Full | Reduced | Service |
|-------------|--|------|---------|---------|
| (0018,9517) | End Acquisition DateTime | Yes | No | No |
| (0018,A003) | Contribution Description | Yes | Yes | No |
| (0020,000D) | Study Instance UID | Yes | No | Yes |
| (0020,000E) | Series Instance UID | Yes | No | Yes |
| (0020,0010) | Study ID | Yes | Yes | No |
| (0020,0052) | Frame of Reference UID | Yes | No | No |
| (0020,0200) | Synchronization Frame of Reference UID | Yes | No | No |
| (0020,3401) | Modifying Device ID | Yes | Yes | No |
| (0020,3404) | Modifying Device Manufacturer | Yes | Yes | No |
| (0020,3406) | Modified Image Description | Yes | Yes | No |
| (0020,4000) | Image Comments | Yes | Yes | No |
| (0020,9158) | Frame Comments | Yes | Yes | No |
| (0020,9161) | Concatenation UID | Yes | No | No |
| (0020,9164) | Dimension Organization UID | Yes | No | No |
| (0028,1199) | Palette Color Lookup Table UID | Yes | No | No |
| (0028,1214) | Large Palette Color Lookup Table UID | Yes | No | No |
| (0028,4000) | Image Presentation Comments | Yes | Yes | No |
| (0032,0012) | Study ID Issuer | Yes | Yes | No |
| (0032,1020) | Scheduled Study Location | Yes | Yes | No |
| (0032,1021) | Scheduled Study Location AE Title | Yes | Yes | No |
| (0032,1030) | Reason for Study | Yes | Yes | No |
| (0032,1032) | Requesting Physician | Yes | Yes | No |
| (0032,1033) | Requesting Service | Yes | Yes | No |
| (0032,1060) | Requested Procedure Description | Yes | Yes | No |
| (0032,1070) | Requested Contrast Agent | Yes | Yes | No |
| (0032,4000) | Study Comments | Yes | Yes | No |
| (0038,0004) | Referenced Patient Alias Sequence | Yes | Yes | No |
| (0038,0010) | Admission ID | Yes | Yes | No |
| (0038,0011) | Issuer of Admission ID | Yes | Yes | No |
| (0038,001E) | Scheduled Patient Institution Residence | Yes | Yes | No |
| (0038,0020) | Admitting Date | Yes | No | No |
| (0038,0021) | Admitting Time | Yes | No | No |
| (0038,0040) | Discharge Diagnosis Description | Yes | Yes | No |
| (0038,0050) | Special Needs | Yes | Yes | No |
| (0038,0060) | Service Episode ID | Yes | Yes | No |
| (0038,0061) | Issuer of Service Episode ID | Yes | Yes | No |
| (0038,0062) | Service Episode Description | Yes | Yes | No |
| (0038,0300) | Current Patient Location | Yes | Yes | No |
| (0038,0400) | Patient's Institution Residence | Yes | Yes | No |
| (0038,0500) | Patient State | Yes | Yes | No |
| (0038,4000) | Visit Comments | Yes | Yes | No |
| (0040,0001) | Scheduled Station AE Title | Yes | Yes | No |
| (0040,0002) | Scheduled Procedure Step Start Date | Yes | No | No |
| (0040,0003) | Scheduled Procedure Step Start Time | Yes | No | No |
| (0040,0004) | Scheduled Procedure Step End Date | Yes | No | No |
| (0040,0005) | Scheduled Procedure Step End Time | Yes | No | No |
| (0040,0006) | Scheduled Performing Physician Name | Yes | Yes | No |
| (0040,0007) | Scheduled Procedure Step Description | Yes | Yes | No |
| (0040,000B) | Scheduled Performing Physician Identification Sequence | Yes | Yes | No |
| (0040,0010) | Scheduled Station Name | Yes | Yes | No |
| (0040,0011) | Scheduled Procedure Step Location | Yes | Yes | No |
| (0040,0012) | Pre-Medication | Yes | Yes | No |
| (0040,0241) | Performed Station AE Title | Yes | Yes | No |
| (0040,0242) | Performed Station Name | Yes | Yes | No |
| (0040,0243) | Performed Location | Yes | Yes | No |
| (0040,0244) | Performed Procedure Step Start Date | Yes | No | No |
| (0040,0245) | Performed Procedure Step Start Time | Yes | No | No |
| (0040,0248) | Performed Station Name Code Sequence | Yes | Yes | No |
| (0040,0250) | Performed Procedure Step End Date | Yes | No | No |
| (0040,0251) | Performed Procedure Step End Time | Yes | No | No |
| (0040,0253) | Performed Procedure Step ID | Yes | Yes | No |
| (0040,0254) | Performed Procedure Step Description | Yes | Yes | No |
| (0040,0275) | Request Attributes Sequence | Yes | Yes | No |
| (0040,0280) | Comments on Performed Procedure Step | Yes | Yes | No |
| (0040,0555) | Acquisition Context Sequence | Yes | Yes | No |
| (0040,1001) | Requested Procedure ID | Yes | Yes | No |
| (0040,1004) | Patient Transport Arrangements | Yes | Yes | No |
| (0040,1005) | Requested Procedure Location | Yes | Yes | No |
| (0040,1010) | Names of Intended Recipient of Results | Yes | Yes | No |
| (0040,1011) | Intended Recipients of Results Identification Sequence | Yes | Yes | No |

| DICOM Tag | Attribute Name | Full | Reduced | Service |
|-------------|---|------|---------|---------|
| (0040,1101) | Person Identification Code Sequence | Yes | Yes | No |
| (0040,1102) | Person Address | Yes | Yes | No |
| (0040,1103) | Person Telephone Numbers | Yes | Yes | No |
| (0040,1400) | Requested Procedure Comments | Yes | Yes | No |
| (0040,2001) | Reason for Imaging Service Request | Yes | Yes | No |
| (0040,2008) | Order Entered By | Yes | Yes | No |
| (0040,2009) | Order Enterer Location | Yes | Yes | No |
| (0040,2010) | Order Callback Phone Number | Yes | Yes | No |
| (0040,2016) | Placer Order Number of Imaging Service Request | Yes | Yes | No |
| (0040,2017) | Filler Order Number of Imaging Service Request | Yes | Yes | No |
| (0040,2400) | Imaging Service Request Comments | Yes | Yes | No |
| (0040,3001) | Confidentiality Constraint on Patient Data Description | Yes | Yes | No |
| (0040,4005) | Scheduled Procedure Step Start DateTime | Yes | No | No |
| (0040,4010) | Scheduled Procedure Step Modification DateTime | Yes | No | No |
| (0040,4011) | Expected Completion Date Time | Yes | No | No |
| (0040,4023) | Referenced General Purpose Scheduled Procedure Step Transaction UID | Yes | No | No |
| (0040,4025) | Scheduled Station Name Code Sequence | Yes | Yes | No |
| (0040,4027) | Scheduled Station Geographic Location Code Sequence | Yes | Yes | No |
| (0040,4030) | Performed Station Geographic Location Code Sequence | Yes | Yes | No |
| (0040,4034) | Scheduled Human Performers Sequence | Yes | Yes | No |
| (0040,4035) | Actual Human Performers Sequence | Yes | Yes | No |
| (0040,4036) | Human Performers Organization | Yes | Yes | No |
| (0040,4037) | Human Performers Name | Yes | Yes | No |
| (0040,4050) | Performed Procedure Step Start DateTime | Yes | No | No |
| (0040,4051) | Performed Procedure Step End DateTime | Yes | No | No |
| (0040,4052) | Procedure Step Cancellation DateTime | Yes | No | No |
| (0040,A027) | Verifying Organization | Yes | Yes | No |
| (0040,A073) | Verifying Observer Sequence | Yes | Yes | No |
| (0040,A075) | Verifying Observer Name | Yes | Yes | No |
| (0040,A078) | Author Observer Sequence | Yes | Yes | No |
| (0040,A07A) | Participant Sequence | Yes | Yes | No |
| (0040,A07C) | Custodial Organization Sequence | Yes | Yes | No |
| (0040,A088) | Verifying Observer Identification Code Sequence | Yes | Yes | No |
| (0040,A123) | Person Name | Yes | Yes | No |
| (0040,A124) | UID | Yes | Yes | No |
| (0040,A171) | Observation UID | Yes | No | No |
| (0040,A172) | Referenced Observation UID (Trial) | Yes | No | No |
| (0040,A192) | Observation Date (Trial) | Yes | No | No |
| (0040,A193) | Observation Time (Trial) | Yes | No | No |
| (0040,A307) | Current Observer (Trial) | Yes | Yes | No |
| (0040,A352) | Verbal Source (Trial) | Yes | Yes | No |
| (0040,A353) | Address (Trial) | Yes | Yes | No |
| (0040,A354) | Telephone Number (Trial) | Yes | Yes | No |
| (0040,A358) | Verbal Source Identifier Code Sequence (Trial) | Yes | Yes | No |
| (0040,A402) | Observation Subject UID (Trial) | Yes | No | No |
| (0040,A730) | Content Sequence | Yes | Yes | No |
| (0040,DB0C) | Template Extension Organization UID | Yes | No | No |
| (0040,DB0D) | Template Extension Creator UID | Yes | No | No |
| (0070,0001) | Graphic Annotation Sequence | Yes | Yes | No |
| (0070,0084) | Content Creator's Name | Yes | Yes | No |
| (0070,0086) | Content Creator's Identification Code Sequence | Yes | Yes | No |
| (0070,031A) | Fiducial UID | Yes | No | No |
| (0088,0140) | Storage Media Fileset UID | Yes | No | No |
| (0088,0200) | Icon Image Sequence | Yes | Yes | No |
| (0088,0904) | Topic Title | Yes | Yes | No |
| (0088,0906) | Topic Subject | Yes | Yes | No |
| (0088,0910) | Topic Author | Yes | Yes | No |
| (0088,0912) | Topic Keywords | Yes | Yes | No |
| (0400,0100) | Digital Signature UID | Yes | Yes | No |
| (0400,0402) | Referenced Digital Signature Sequence | Yes | Yes | No |
| (0400,0403) | Referenced SOP Instance MAC Sequence | Yes | Yes | No |
| (0400,0404) | MAC | Yes | Yes | No |
| (0400,0550) | Modified Attributes Sequence | Yes | Yes | No |
| (0400,0561) | Original Attributes Sequence | Yes | Yes | No |
| (2030,0020) | Text String | Yes | Yes | No |
| (3006,0024) | Referenced Frame of Reference UID | Yes | No | No |
| (3006,00C2) | Related Frame of Reference UID | Yes | No | No |
| (3008,0105) | Source Serial Number | No | No | No |
| (300A,0013) | Dose Reference UID | Yes | No | No |

| DICOM Tag | Attribute Name | Full | Reduced | Service |
|-------------|--------------------------------------|------|---------|---------|
| (300E,0008) | Reviewer Name | Yes | Yes | No |
| (4000,0010) | Arbitrary | Yes | Yes | No |
| (4000,4000) | Text Comments | Yes | Yes | No |
| (4008,0042) | Results ID Issuer | Yes | Yes | No |
| (4008,0102) | Interpretation Recorder | Yes | Yes | No |
| (4008,010A) | Interpretation Transcriber | Yes | Yes | No |
| (4008,010B) | Interpretation Text | Yes | Yes | No |
| (4008,010C) | Interpretation Author | Yes | Yes | No |
| (4008,0111) | Interpretation Approver Sequence | Yes | Yes | No |
| (4008,0114) | Physician Approving Interpretation | Yes | Yes | No |
| (4008,0115) | Interpretation Diagnosis Description | Yes | Yes | No |
| (4008,0118) | Results Distribution List Sequence | Yes | Yes | No |
| (4008,0119) | Distribution Name | Yes | Yes | No |
| (4008,011A) | Distribution Address | Yes | Yes | No |
| (4008,0202) | Interpretation ID Issuer | Yes | Yes | No |
| (4008,0300) | Impressions | Yes | Yes | No |
| (4008,4000) | Results Comments | Yes | Yes | No |
| (50xx,xxxx) | Curve Data | Yes | Yes | No |
| (60xx,0100) | Overlay Bits Allocated | Yes | Yes | No |
| (60xx,0102) | Overlay Bit Position | Yes | Yes | No |
| (60xx,3000) | Overlay Data | Yes | Yes | No |
| (60xx,4000) | Overlay Comments | Yes | Yes | No |
| (FFFA,FFFA) | Digital Signatures Sequence | Yes | Yes | No |
| (FFFC,FFFC) | Data Set Trailing Padding | Yes | Yes | No |

6 SUPPORT OF CHARACTER SETS

6.1 CHARACTER SETS FOR syngo.via

The **syngo.via** DICOM application supports the following character sets as defined in the three tables below.

Table 6-1: Single-Byte Character Sets without Code Extension

| Character Set Description | Defined Term | ISO registration number | Character Set |
|---------------------------|--------------|-------------------------|----------------------|
| Default repertoire | none | ISO_IR 6 | ISO 646: |
| Latin alphabet No. 1 | ISO_IR 100 | ISO_IR 100 | Supplementary set |
| | | ISO_IR 6 | ISO 646: |
| Latin alphabet No. 2 | ISO_IR 101 | ISO_IR 101 | Supplementary set |
| | | ISO_IR 6 | ISO 646 |
| Latin alphabet No. 3 | ISO_IR 109 | ISO_IR 109 | Supplementary set |
| | | ISO_IR 6 | ISO 646 |
| Latin alphabet No. 4 | ISO_IR 110 | ISO_IR 110 | Supplementary set |
| | | ISO_IR 6 | ISO 646 |
| Cyrillic | ISO_IR 144 | ISO_IR 144 | Supplementary set |
| | | ISO_IR 6 | ISO 646 |
| Arabic | ISO_IR 127 | ISO_IR 127 | Supplementary set |
| | | ISO_IR 6 | ISO 646 |
| Greek | ISO_IR 126 | ISO_IR 126 | Supplementary set |
| | | ISO_IR 6 | ISO 646 |
| Hebrew | ISO_IR 138 | ISO_IR 138 | Supplementary set |
| | | ISO_IR 6 | ISO 646 |
| Latin alphabet No. 5 | ISO_IR 148 | ISO_IR 148 | Supplementary set |
| | | ISO_IR 6 | ISO 646 |
| Japanese | ISO_IR 13 | ISO_IR 13 | JIS X 0201: Katakana |
| | | ISO_IR 14 | JIS X 0201: Romaji |
| Thai | ISO_IR166 | ISO_IR166 | TIS 620-253 (1990) |
| | | ISO_IR 6 | ISO 646 |

Table 6-2: Single-Byte Characters Sets with Code Extension

| Character Set Description | Defined Term | Standard for Code Extension | ESC sequence | ISO registration number | Character Set |
|---------------------------|-----------------|-----------------------------|-----------------|-------------------------|-------------------|
| Default repertoire | ISO 2022 IR 6 | ISO 2022 | ESC 02/08 04/02 | ISO-IR 6 | ISO 646 |
| Latin alphabet No.1 | ISO 2022 IR 100 | ISO 2022 | ESC 02/13 04/01 | ISO-IR 100 | Supplementary set |
| | | ISO 2022 | ESC 02/08 04/02 | ISO-IR 6 | ISO 646 |
| Latin alphabet No.2 | ISO 2022 IR 101 | ISO 2022 | ESC 02/13 04/02 | ISO-IR 101 | Supplementary set |
| | | ISO 2022 | ESC 02/08 04/02 | ISO-IR 6 | ISO 646 |
| Latin alphabet No.3 | ISO 2022 IR 109 | ISO 2022 | ESC 02/13 04/03 | ISO-IR 109 | Supplementary set |
| | | ISO 2022 | ESC 02/08 04/02 | ISO-IR 6 | ISO 646 |
| Latin alphabet No.4 | ISO 2022 IR 110 | ISO 2022 | ESC 02/13 04/04 | ISO-IR 110 | Supplementary set |
| | | ISO 2022 | ESC 02/08 04/02 | ISO-IR 6 | ISO 646 |

Multi-Byte Character Sets without Code Extension

Table 6-3: Multi-Byte Character Sets without Code Extension

| Character Set Description | Defined Term | ISO registration number | Character Set |
|---------------------------|--------------|-------------------------|---|
| Unicode | ISO_IR 192 | ISO 10646 | Unicode in UTF-8 |
| Chinese | GB18030 | GB18030 | GB 18030-2000 (China Association for Standardization) |

Table 6-4: Multi-Byte Character Sets with Code Extension

| Character Set Description | Defined Term | Standard for Code Extension | ESC sequence | ISO registration number | Character Set |
|---------------------------|-----------------|-----------------------------|-----------------------|-------------------------|-------------------------------------|
| Japanese | ISO 2022 IR 159 | ISO 2022 | ESC 02/04 02/08 04/04 | ISO-IR 159 | JIS X 0212: Supplementary Kanji set |
| Korean | ISO 2022 IR 149 | ISO 2022 | ESC 02/04 02/09 04/03 | ISO-IR 149 | KS X 1001: Hangul and Hanja |

All SCS listed above are supported for incoming Data. When creating new Instances, the system will use the default SCS (or SCS List) configured on the machine.

When there is a mismatch between the given character set in attribute (0008,0005) and the characters in an IOD received by the system, then the following measures are taken to make the characters DICOM conform:

- Convert each illegal character to a '?'.

There are now three categories of character sets which have to be differentiated because of their different encoding formats:

- Conventional ISO character sets: ISO_IR 6, ISO 2022 IR 6, ISO_IR 100, etc.
→ encoded in ISO 2022
- ISO_IR 192 → encoded in UTF-8
- GB18030 → encoded in GB18030

It is not possible to recognize the following mismatches automatically on receiving or importing:

- An attribute value is encoded in ISO_IR 192 ↔ (0008,0005) contains a conventional ISO character set as primary character set
- An attribute value is encoded in GB18030 ↔ (0008,0005) contains a conventional ISO character set as primary character set
- An attribute value is encoded in ISO 2022 ↔ (0008,0005) contains ISO_IR 192

- An attribute value is encoded in ISO 2022 \leftrightarrow (0008,0005) contains GB18030

An IOD that contains one of the above mentioned inconsistencies is not DICOM conform. As these kinds of inconsistencies cannot be recognized by the system, the IOD will not be rejected but the character data might be corrupted.

The **syngo.via** supports Kanji characters in the byte zones after 74 (79, 7A, 7B and 7C).

7 SECURITY

7.1 SECURITY PROFILES

Time Synchronization Profiles: **syngo.via** acts as an NTP Client in the Maintain Time Transaction.

7.2 ASSOCIATION LEVEL SECURITY

It is possible to configure whether the SCP will only answer to known AETs or to any AET.

7.3 APPLICATION LEVEL SECURITY

- User must login with own password
- For configuration and Maintenance, Service Technician must login with a separate password.

8 ANNEXES

8.1 SOP Classes supported

Table 8-1 SOP CLASSES for Storage

| SOP Class Name | SOP Class UID | User of Service (SCU) | Provider of Service (SCP) | Visualization |
|--|--------------------------------|-----------------------|---------------------------|---------------|
| Supported Storage SOP Classes | | | | |
| 12-lead ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.1 | Yes | Yes | No |
| Ambulatory ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.3 | Yes | Yes | No |
| Basic Text Structured Report Storage | 1.2.840.10008.5.1.4.1.1.88.11 | Yes | Yes | No |
| Blending Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.4 | Yes | Yes | No |
| Breast Tomosynthesis Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.3 | Yes | Yes | Yes |
| Cardiac Electrophysiology Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.3.1 | Yes | Yes | No |
| Color Softcopy Presentation State Storage (store & forward only) | 1.2.840.10008.5.1.4.1.1.11.2 | Yes | Yes | No |
| Comprehensive SR | 1.2.840.10008.5.1.4.1.1.88.33 | Yes | Yes | No |
| Computed Radiography Image Storage | 1.2.840.10008.5.1.4.1.1.1 | Yes | Yes | Yes |
| Computed Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.2 | Yes | Yes | Yes |
| Deformable Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.3 | Yes | Yes | No |
| Digital Mammography Image Storage for Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | Yes | Yes | Yes |
| Digital Mammography Image Storage for Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | Yes | Yes | Yes |
| Digital X-Ray Image Storage- for Presentation | 1.2.840.10008.5.1.4.1.1.1.1 | Yes | Yes | Yes |
| Digital X-Ray Image Storage – for Processing | 1.2.840.10008.5.1.4.1.1.1.1.1 | Yes | Yes | Yes |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 | Yes | Yes | No |
| Enhanced Computed Tomography Image Storage | 1.2.840.10008.5.1.4.1.1.2.1 | Yes | Yes | No |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | Yes | Yes | Yes |
| Enhanced MR Color Image Storage | 1.2.840.10008.5.1.4.1.1.4.3 | Yes | Yes | Yes |
| Enhanced Structured Report Storage | 1.2.840.10008.5.1.4.1.1.88.22 | Yes | Yes | No |
| Enhanced XA Image Storage | 1.2.840.10008.5.1.4.1.1.12.1.1 | Yes | Yes | Yes |
| Enhanced XRF Image Storage | 1.2.840.10008.5.1.4.1.1.12.2.1 | Yes | Yes | Yes |
| General ECG Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.1.2 | Yes | Yes | No |
| Grayscale Softcopy Presentation State Storage (store & forward only) | 1.2.840.10008.5.1.4.1.1.11.1 | Yes | Yes | No |
| Hemodynamic Waveform Storage | 1.2.840.10008.5.1.4.1.1.9.2.1 | Yes | Yes | No |
| Key Object Selection Document Storage | 1.2.840.10008.5.1.4.1.1.88.59 | Yes | Yes | Yes |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | Yes | Yes | Yes |

| SOP Class Name | SOP Class UID | User of Service (SCU) | Provider of Service (SCP) | Visualization |
|--|--------------------------------|-----------------------|---------------------------|---------------|
| Mammography CAD SR Storage | 1.2.840.10008.5.1.4.1.1.88.50 | Yes | Yes | No |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 | Yes | Yes | Yes |
| Multi-frame Grayscale Byte Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.2 | Yes | Yes | Yes |
| Multi-frame Grayscale Word Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.3 | Yes | Yes | Yes |
| Multi-frame Single Bit Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.1 | Yes | Yes | Yes |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | Yes | Yes | Yes |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 | Yes | Yes | Yes |
| Pseudo-Color Softcopy Presentation State Storage | 1.2.840.10008.5.1.4.1.1.11.3 | Yes | Yes | No |
| PET Image Storage | 1.2.840.10008.5.1.4.1.1.128 | Yes | Yes | Yes |
| Procedure Log Storage | 1.2.840.10008.5.1.4.1.1.88.40 | Yes | Yes | No |
| Raw DataStorage | 1.2.840.10008.5.1.4.1.1.66 | Yes | Yes | No |
| Real World Value Mapping Storage | 1.2.840.10008.5.1.4.1.1.67 | Yes | Yes | No |
| RT Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.4 | Yes | Yes | No |
| RT Dose Storage | 1.2.840.10008.5.1.4.1.1.481.2 | Yes | Yes | Yes |
| RT Image Storage | 1.2.840.10008.5.1.4.1.1.481.1 | Yes | Yes | Yes |
| RT Ion Beams Treatment Record Storage | 1.2.840.10008.5.1.4.1.1.481.9 | Yes | Yes | No |
| RT Ion Plan Storage | 1.2.840.10008.5.1.4.1.1.481.8 | Yes | Yes | No |
| RT Plan Storage | 1.2.840.10008.5.1.4.1.1.481.5 | Yes | Yes | Yes |
| RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 | Yes | Yes | Yes |
| RT Treatment Summary Record Storage | 1.2.840.10008.5.1.4.1.1.481.7 | Yes | Yes | No |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | Yes | Yes | Yes |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 | Yes | Yes | No |
| Spatial Fiducials Storage | 1.2.840.10008.5.1.4.1.1.66.2 | Yes | Yes | No |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | Yes | Yes | No |
| Surface Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.5 | Yes | Yes | No |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | Yes | Yes | Yes |
| Ultrasound Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.6 | Yes | Yes | Yes |
| Ultrasound Multi-Frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | Yes | Yes | Yes |
| Ultrasound Multi-frame Image Storage (Retired) | 1.2.840.10008.5.1.4.1.1.3 | Yes | Yes | Yes |
| X-Ray 3D Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.13.1.1 | Yes | Yes | Yes |
| X-Ray Angiographic Image Storage | 1.2.840.10008.5.1.4.1.1.12.1 | Yes | Yes | Yes |
| X-Ray Radiation Dose Structured Report Storage | 1.2.840.10008.5.1.4.1.1.88.67 | Yes | Yes | No |
| X-Ray Radio-Fluoroscopic Image Storage | 1.2.840.10008.5.1.4.1.1.12.2 | Yes | Yes | Yes |
| Supported private Storage SOP Classes | | | | |
| CSA Non-Image Storage | 1.3.12.2.1107.5.9.1 | No | Yes | No |

Table 8-2: Supported Non-Storage SOP Classes

| SOP Class Name | SOP Class UID | User of Service (SCU) | Provider of Service (SCP) | Visualization |
|---|-----------------------------|-----------------------|---------------------------|---------------|
| Supported Verification SOP Classes | | | | |
| Verification | 1.2.840.10008.1.1 | Yes | Yes | No |
| Supported Storage Commitment SOP Classes | | | | |
| Storage Commitment Push Model | 1.2.840.10008.1.20.1 | Yes | Yes | No |
| Storage Commitment Push Model well known SOP Instance | 1.2.840.10008.1.20.1.1 | Yes | Yes | No |
| Supported Query/Retrieve-FIND SOP Classes | | | | |
| Patient Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Yes | Yes | No |
| Study Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Yes | Yes | No |
| Patinet /Study Only Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.3.1 | Yes | Yes | No |
| Supported Query/Retrieve-MOVE SOP Classes | | | | |
| Study Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Yes | Yes | No |
| Patient Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Yes | Yes | No |
| Patient/Study Only Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.3.2 | Yes | Yes | No |
| Modality Worklist Information SOP Class | | | | |
| Modality Worklist Information Model - FIND | 1.2.840.10008.5.1.4.31 | Yes | No | No |
| Grayscale Print Management META SOP classes | | | | |
| Basic Grayscale Print Management Meta SOP Class | 1.2.840.10008.5.1.1.9 | Yes | No | No |
| - Basic Film Session SOP Class | 1.2.840.10008.5.1.1.1 | Yes | No | No |
| - Basic Film Box SOP Class | 1.2.840.10008.5.1.1.2 | Yes | No | No |
| - Basic Grayscale Image Box SOP Class | 1.2.840.10008.5.1.1.4 | Yes | No | No |
| - Printer SOP Class | 1.2.840.10008.5.1.1.16 | Yes | No | No |
| Print Job SOP Class | 1.2.840.10008.5.1.1.14 | Yes | No | No |
| Presentation LUT SOP Class | 1.2.840.10008.5.1.1.23 | Yes | No | No |
| Color Print Management META SOP classes | | | | |
| Basic Color Print Management Meta SOP Class | 1.2.840.10008.5.1.1.18 | Yes | No | No |
| - Basic Film Session SOP Class | 1.2.840.10008.5.1.1.1 | Yes | No | No |
| - Basic Film Box SOP Class | 1.2.840.10008.5.1.1.2 | Yes | No | No |
| - Basic Color Image Box SOP Class | 1.2.840.10008.5.1.1.4.1 | Yes | No | No |
| - Printer SOP Class | 1.2.840.10008.5.1.1.16 | Yes | No | No |
| Print Job SOP Class | 1.2.840.10008.5.1.1.14 | Yes | No | No |

8.2 IOD CONTENTS

8.2.1 Created SOP Instance(s)

The applications from **syngo.via** create objects of the following SOP Classes during Transferring, Post-Processing and Reading:

Table 8-3: List of created SOP Classes

| SOP Class Name | SOP Class UID | Internally used (neither SCU nor SCP is applicable) |
|--|-------------------------------|---|
| Basic Text Structured Report | 1.2.840.10008.5.1.4.1.1.88.11 | No |
| Comprehensive Structured Report Storage | 1.2.840.10008.5.1.4.1.1.88.33 | No |
| CT Image Storage | 1.2.840.10008.5.1.4.1.1.2 | No |
| Encapsulated PDF Storage | 1.2.840.10008.5.1.4.1.1.104.1 | No |
| Enhanced MR Color Image Storage | 1.2.840.10008.5.1.4.1.1.4.3 | No |
| Enhanced MR Image Storage | 1.2.840.10008.5.1.4.1.1.4.1 | No |
| Enhanced Structured Report | 1.2.840.10008.5.1.4.1.1.88.22 | No |
| Grayscale Softcopy Presentation State | 1.2.840.10008.5.1.4.1.1.11.1 | No |
| MR Image Storage | 1.2.840.10008.5.1.4.1.1.4 | No |
| MR Spectroscopy Storage | 1.2.840.10008.5.1.4.1.1.4.2 | No |
| Multi-frame True Color Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7.4 | No |
| Nuclear Medicine Image Storage | 1.2.840.10008.5.1.4.1.1.20 | No |
| Raw Data Storage | 1.2.840.10008.5.1.4.1.1.66 | No |
| Real World Value Mapping Storage | 1.2.840.10008.5.1.4.1.1.67 | No |
| RT Structure Set Storage | 1.2.840.10008.5.1.4.1.1.481.3 | No |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | No |
| Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.4 | No |
| Siemens AX frame sets | 1.3.12.2.1107.5.99.3.11 | Yes |
| Siemens CT MR volume files | 1.3.12.2.1107.5.99.3.10 | Yes |
| Spatial Registration Storage | 1.2.840.10008.5.1.4.1.1.66.1 | No |
| Surface Segmentation Storage | 1.2.840.10008.5.1.4.1.1.66.5 | No |

See chapter 4.2.1.3.1.4 for further details about encapsulation.

8.2.2 Data Dictionary of Private Attributes

The following table Table 8-4: Private Data Element Dictionary lists all private attributes created by **syngo.via**, which may be included in the generated instances. These private attributes may be deprecated or replaced with standard DICOM SOP Classes or attributes in the future.

Table 8-4: Private Data Element Dictionary

| DICOM Tag | Name | VR | VM |
|---|---------------------------------|----|-----|
| (0027,SIEMENS SYNGO ENHANCED IDATASET API,01) | Business Unit Code | CS | 1 |
| (0027,SIEMENS SYNGO ENHANCED IDATASET API,02) | Application Type | LO | 1 |
| (0027,SIEMENS SYNGO ENHANCED IDATASET API,03) | Application Attributes Sequence | SQ | 1 |
| (0029,SIEMENS SYNGO FUNCTION ASSIGNMENT,01) | Data Reference | LO | 1 |
| (0009,SIEMENS SYNGO INDEX SERVICE,20) | Object Insertion Date | DA | 1 |
| (0009,SIEMENS SYNGO INDEX SERVICE,A0) | Sender System Device Name | LO | 1 |
| (0029,SIEMENS SYNGO VOLUME,12) | Slices | US | 1 |
| (0029,SIEMENS SYNGO VOLUME,14) | Volume Histogram | OB | 1 |
| (0029,SIEMENS SYNGO VOLUME,18) | Volume Level | IS | 1 |
| (0029,SIEMENS SYNGO VOLUME,30) | Voxel Spacing | DS | 3 |
| (0029,SIEMENS SYNGO VOLUME,32) | Volume Position (Patient) | DS | 3 |
| (0029,SIEMENS SYNGO VOLUME,37) | Volume Orientation (Patient) | DS | 9 |
| (0029,SIEMENS SYNGO VOLUME,40) | Resampling Flag | CS | 1 |
| (0029,SIEMENS SYNGO VOLUME,42) | Normalization Flag | CS | 1 |
| (0029,SIEMENS SYNGO VOLUME,44) | SubVolume Sequence | SQ | 1-n |
| (0071,SIEMENS SYNGO REGISTRATION,20) | Registered Image Sequence | SQ | 1 |
| (0071,SIEMENS SYNGO REGISTRATION,21) | Registration Is Validated Flag | CS | 1 |
| (0071,SIEMENS SYNGO REGISTRATION,20) | Registered Image Sequence | SQ | 1 |
| (0071,SIEMENS SYNGO REGISTRATION,21) | Registration Is Validated Flag | CS | 1 |
| (7FDF,SIEMENS SYNGO DATA PADDING,FC) | Pixel Data Leading Padding | OB | 1 |

Interpretation of the Dicom Tags from the above table:

(gggg, pp,ee) -> (gggg, ppee)

gggg - odd group number

pp - private creator identification code

ee - private element

8.2.3 Usage of Attributes from received IODs

N/A

8.2.4 Attribute mapping

There is currently no mapping from attributes received in DICOM Modality Worklist to other attributes.

8.2.5 Coerced / Modified fields

N/A

8.3 CODED TERMINOLOGY AND TEMPLATES

See application specific annexes.

8.3.1 Context Groups

See application specific annexes.

8.3.2 Template Specifications

See application specific annexes.

8.3.3 Private Code definitions

See application specific annexes.

8.4 GRAYSCALE IMAGE CONSISTENCY

N/A

8.5 STANDARD EXTENDED / SPECIALIZED / PRIVATE SOP CLASSES

N/A

8.6 DICOM Print SCU – detailed status displays

The following tables document the behavior of the **syngo.via** DICOM Print AE in response to messages received for the printer SOP class and the print job SOP class.

Definitions of camera symbols:

- Idle: Camera is installed and ready; idle icon is displayed.
- Interact: The user has to react in near future, but not immediately.
Example: A camera was low in 8x10 clear sheets: LOW 8x10 CLR was sent by N-EVENT-REPORT.
- Queue Stopped: The user has to react immediately. Either the camera needs immediate interaction or a job has been aborted.
Example: A camera is out of 8x10 clear sheets, or camera is down, or a film job is aborted.

Note: different camera symbols are displayed according to the Printer Status Info.

8.6.1 Common Status Information

“Common Status Info evaluation”

| Printer Status Info/ Execution Status Info | Description | Message string visible in 'Status Bar' | Other action for UI/ 'camera symbol' |
|---|--|---|---|
| NORMAL | Camera is ready | Camera is ready | <None>/idle |
| BAD RECEIVE MGZ | There is a problem with the film receive magazine. Films from the printer cannot be transported into the magazine. | Problem with receive magazine. | <None>/interact |
| BAD SUPPLY MGZ | There is a problem with the film supply magazine. Films from this magazine | Problem with supply magazine. | <None>/interact |

| Printer Status Info/ Execution Status Info | Description | Message string visible in 'Status Bar' | Other action for UI/ 'camera symbol' |
|---|--|---|---|
| | cannot be transported into the printer. | | |
| CALIBRATING | Printer is performing self calibration, it is expected to be available for normal operation shortly. | Self calibration. Please wait. | <None>/idle |
| CALIBRATION ERR | An error in the printer calibration has been detected, quality of processed films may not be optimal. | Problem in calibration. Film quality may not be optimal. | <None>/interact |
| CHECK CHEMISTRY | A problem with the processor chemicals has been detected, quality of processed films may not be optimal. | Problem with chemistry. Film quality may not be optimal. | <None>/interact |
| CHECK SORTER | There is an error in the film sorter | Error in film sorter. | <None>/interact |
| CHEMICALS EMPTY | There are no processing chemicals in the processor, films will not be printed and processed until the processor is back to normal. | Camera chemistry empty. Please check. | <None>/interact |
| CHEMICALS LOW | The chemical level in the processor is low, if not corrected, it will probably shut down soon. | Camera chemistry low. Please check. | <None>/interact |
| COVER OPEN | One or more printer or processor covers, drawers, doors are open. | Camera cover, drawer or door open. | <None>/interact |
| ELEC CONFIG ERR | Printer configured improperly for this job. | Camera configured improperly for this job. Queue stopped. | Queue for this camera will be STOPPED/ Queue stopped |
| ELEC DOWN | Printer is not operating due to some unspecified electrical hardware problem. | Camera electrical hardware Problem. | <None>/interact |
| ELEC SW ERROR | Printer not operating for some unspecified software error. | Camera software problem. Queue stopped. | Queue for this camera will be STOPPED/ Queue stopped |
| EMPTY 8X10 | The 8x10 inch film supply magazine is empty. | 8x10 film supply empty. | <None>/interact |
| EMPTY 8X10 BLUE | The 8x10 inch blue film supply magazine is empty. | 8x10 blue film supply empty. | <None>/interact |
| EMPTY 8X10 CLR | The 8x10 inch clear film supply magazine is empty. | 8x10 clear film supply empty. | <None>/interact |
| EMPTY 8X10 PAPR | The 8x10 inch paper supply magazine is empty. | 8x10 paper supply empty. | <None>/interact |
| EMPTY 10X12 | The 10x12 inch film supply magazine is empty. | 10x12 film supply empty. | <None>/interact |
| EMPTY 10X12 BLUE | The 10x12 inch blue film supply magazine is empty. | 10x12 blue film supply empty. | <None>/interact |
| EMPTY 10X12 CLR | The 10x12 inch clear film supply magazine is empty. | 10x12 clear film supply empty. | <None>/interact |
| EMPTY 10X12 PAPR | The 10x12 inch paper supply magazine is empty. | 10x12 paper supply empty. | <None>/interact |
| EMPTY 10X14 | The 10x14 inch film supply magazine is empty. | 10x14 film supply empty. | <None>/interact |
| EMPTY 10X14 BLUE | The 10x14 inch blue film supply magazine is empty. | 10x14 blue film supply empty. | <None>/interact |
| EMPTY 10X14 CLR | The 10x14 inch clear film supply magazine is empty. | 10x14 clear film supply empty. | <None>/interact |
| EMPTY 10X14 PAPR | The 10x14 inch paper supply magazine is empty. | 10x14 paper supply empty. | <None>/interact |
| EMPTY 11X14 | The 11x14 inch film supply magazine is empty. | 11x14 film supply empty. | <None>/interact |
| EMPTY 11X14 BLUE | The 11x14 inch blue film supply magazine is empty. | 11x14 blue film supply empty. | <None>/interact |
| EMPTY 11X14 CLR | The 11x14 inch clear film supply magazine is empty. | 11x14 clear film supply empty. | <None>/interact |
| EMPTY 11X14 PAPR | The 11x14 inch paper supply magazine is empty. | 11x14 paper supply empty. | <None>/interact |
| EMPTY 14X14 | The 14x14 inch film supply magazine is empty. | 14x14 film supply empty. | <None>/interact |
| EMPTY 14X14 BLUE | The 14x14 inch blue film supply magazine is empty. | 14x14 blue film supply empty. | <None>/interact |
| EMPTY 14X14 CLR | The 14x14 inch clear film supply magazine is empty. | 14x14 clear film supply empty. | <None>/interact |
| EMPTY 14X14 PAPR | The 14x14 inch paper supply magazine is empty. | 14x14 paper supply empty. | <None>/interact |

| Printer Status Info/ Execution Status Info | Description | Message string visible in 'Status Bar' | Other action for UI/ 'camera symbol' |
|---|---|---|---|
| EMPTY 14X17 | The 14x17 inch film supply magazine is empty. | 14x17 film supply empty. | <None>/interact |
| EMPTY 14X17 BLUE | The 14x17 inch blue film supply magazine is empty. | 14x17 blue film supply empty. | <None>/interact |
| EMPTY 14X17 CLR | The 14x17 inch clear film supply magazine is empty. | 14x17 clear film supply empty. | <None>/interact |
| EMPTY 14X17 PAPR | The 14x17 inch paper supply magazine is empty. | 14x17 paper supply empty. | <None>/interact |
| EMPTY 24X24 | The 24x24 inch film supply magazine is empty. | 24x24 film supply empty. | <None>/interact |
| EMPTY 24X24 BLUE | The 24x24 inch blue film supply magazine is empty. | 24x24 blue film supply empty. | <None>/interact |
| EMPTY 24X24 CLR | The 24x24 inch clear film supply magazine is empty. | 24x24 clear film supply empty. | <None>/interact |
| EMPTY 24X24 PAPR | The 24x24 inch paper supply magazine is empty. | 24x24 paper supply empty. | <None>/interact |
| EMPTY 24X30 | The 24x30 inch film supply magazine is empty. | 24x30 film supply empty. | <None>/interact |
| EMPTY 24X30 BLUE | The 24x30 inch blue film supply magazine is empty. | 24x30 blue film supply empty. | <None>/interact |
| EMPTY 24X30 CLR | The 24x30 inch clear film supply magazine is empty. | 24x30 clear film supply empty. | <None>/interact |
| EMPTY 24X30 PAPR | The 24x30 inch paper supply magazine is empty. | 24x30 paper supply empty. | <None>/interact |
| EMPTY A4 PAPR | The A4 paper supply magazine is empty. | A4 paper supply empty. | <None>/interact |
| EMPTY A4 TRANS | The A4 transparency supply magazine is empty. | A4 transparency supply empty. | <None>/interact |
| EXPOSURE FAILURE | The exposure device has failed due to some unspecified reason. | Exposure device has failed. | <None>/interact |
| FILM JAM | A film transport error has occurred and a film is jammed in the printer or processor. | Film jam. | <None>/interact |
| FILM TRANSP ERR | There is a malfunction with the film transport, there may or may not be a film jam. | Film transport problem. | <None>/interact |
| FINISHER EMPTY | The finisher is empty. | Finisher is empty. | <None>/interact |
| FINISHER ERROR | The finisher is not operating due to some unspecified reason. | Finisher problem. | <None>/interact |
| FINISHER LOW | The finisher is low on supplies. | Finisher low. | <None>/interact |
| LOW 8X10 | The 8x10 inch film supply magazine is low. | 8x10 film supply low. | <None>/interact |
| LOW 8X10 BLUE | The 8x10 inch blue film supply magazine is low. | 8x10 blue film supply low. | <None>/interact |
| LOW 8X10 CLR | The 8x10 inch clear film supply magazine is low. | 8x10 clear film supply low. | <None>/interact |
| LOW 8X10 PAPR | The 8x10 inch paper supply magazine is low. | 8x10 paper supply low. | <None>/interact |
| LOW 10X12 | The 10x12 inch film supply magazine is low. | 10x12 film supply low. | <None>/interact |
| LOW 10X12 BLUE | The 10x12 inch blue film supply magazine is low. | 10x12 blue film supply low. | <None>/interact |
| LOW 10X12 CLR | The 10x12 inch clear film supply magazine is low. | 10x12 clear film supply low. | <None>/interact |
| LOW 10X12 PAPR | The 10x12 inch paper supply magazine is low. | 10x12 paper supply low. | <None>/interact |
| LOW 10X14 | The 10x14 inch film supply magazine is low. | 10x14 film supply low. | <None>/interact |
| LOW 10X14 BLUE | The 10x14 inch blue film supply magazine is low. | 10x14 blue film supply low. | <None>/interact |
| LOW 10X14 CLR | The 10x14 inch clear film supply magazine is low. | 10x14 clear film supply low. | <None>/interact |
| LOW 10X14 PAPR | The 10x14 inch paper supply magazine is low. | 10x14 paper supply low. | <None>/interact |
| LOW 11X14 | The 11x14 inch film supply magazine is low. | 11x14 film supply low. | <None>/interact |
| LOW 11X14 BLUE | The 11x14 inch blue film supply magazine is low. | 11x14 blue film supply low. | <None>/interact |
| LOW 11X14 CLR | The 11x14 inch clear film supply magazine is low. | 11x14 clear film supply low. | <None>/interact |

| Printer Status Info/ Execution Status Info | Description | Message string visible in 'Status Bar' | Other action for UI/ 'camera symbol' |
|---|---|---|---|
| LOW 11X14 PAPR | The 11x14 inch paper supply magazine is low. | 11x14 paper supply low. | <None>/interact |
| LOW 14X14 | The 14x14 inch film supply magazine is low. | 14x14 film supply low. | <None>/interact |
| LOW 14X14 BLUE | The 14x14 inch blue film supply magazine is low. | 14x14 blue film supply low. | <None>/interact |
| LOW 14X14 CLR | The 14x14 inch clear film supply magazine is low. | 14x14 clear film supply low. | <None>/interact |
| LOW 14X14 PAPR | The 14x14 inch paper supply magazine is low. | 14x14 paper supply low. | <None>/interact |
| LOW 14X17 | The 14x17 inch film supply magazine is low. | 14x17 film supply low. | <None>/interact |
| LOW 14X17 BLUE | The 14x17 inch blue film supply magazine is low. | 14x17 blue film supply low. | <None>/interact |
| LOW 14X17 CLR | The 14x17 inch clear film supply magazine is low. | 14x17 clear film supply low. | <None>/interact |
| LOW 14X17 PAPR | The 14x17 inch paper supply magazine is low. | 14x17 paper supply low. | <None>/interact |
| LOW 24X24 | The 24x24 inch film supply magazine is low. | 24x24 film supply low. | <None>/interact |
| LOW 24X24 BLUE | The 24x24 inch blue film supply magazine is low. | 24x24 blue film supply low. | <None>/interact |
| LOW 24X24 CLR | The 24x24 inch clear film supply magazine is low. | 24x24 clear film supply low. | <None>/interact |
| LOW 24X24 PAPR | The 24x24 inch paper supply magazine is low. | 24x24 paper supply low. | <None>/interact |
| LOW 24X30 | The 24x30 inch film supply magazine is low. | 24x30 film supply low. | <None>/interact |
| LOW 24X30 BLUE | The 24x30 inch blue film supply magazine is low. | 24x30 blue film supply low. | <None>/interact |
| LOW 24X30 CLR | The 24x30 inch clear film supply magazine is low. | 24x30 clear film supply low. | <None>/interact |
| LOW 24X30 PAPR | The 24x30 inch paper supply magazine is low. | 24x30 paper supply low. | <None>/interact |
| LOW A4 PAPR | The A4 paper supply magazine is low. | A4 paper supply low. | <None>/interact |
| LOW A4 TRANS | The A4 transparency supply magazine is low. | A4 transparency supply low. | <None>/interact |
| NO RECEIVE MGZ | The film receive magazine is not available. | Film receiver not available. | <None>/interact |
| NO RIBBON | The ribbon cartridge needs to be replaced. | Replace ribbon cartridge. | <None>/interact |
| NO SUPPLY MGZ | The film supply magazine is not available. | Film supply not available. | <None>/interact |
| CHECK PRINTER | The printer is not ready at this time, operator intervention is required to make the printer available. | Check camera. | <None>/interact |
| CHECK PROC | The processor is not ready at this time, operator intervention is required to make the printer available. | Check processor. | <None>/interact |
| PRINTER DOWN | The printer is not operating due to some unspecified reason. | Camera down. | <None>/interact |
| PRINTER INIT | The printer is not ready at this time, it is expected to become available without intervention. For example, it may be in a normal warm-up state. | Camera initializing. | <None>/Idle |
| PRINTER OFFLINE | The printer has been disabled by an operator or service person. | Camera off-line. | <None>/interact |
| PROC DOWN | The processor is not operating due to some unspecified reason. | Processor down. | <None>/interact |
| PROC INIT | The processor is not ready at this time, it is expected to become available without intervention. For example, it may be in a normal warm-up state. | Processor initializing. | <None>/Idle |
| PROC OVERFLOW FL | Processor chemicals are approaching the overflow full mark. | Processor chemicals near overflow. | <None>/interact |
| PROC OVERFLOW HI | Processor chemicals have reached the overflow full mark. | Processor chemicals overflow. | <None>/interact |
| QUEUED | Print job in Queue | -- | <None>/Idle |
| RECEIVER FULL | The film receive magazine is full. | Receiver full. | <None>/interact |
| REQ MED NOT INST | The requested film, paper, or other | Install media supply. | <None>/interact |

| Printer Status Info/ Execution Status Info | Description | Message string visible in 'Status Bar' | Other action for UI/ 'camera symbol' |
|---|---|--|---|
| | media supply magazine is installed in the printer, but may be available with operator intervention. | | |
| REQ MED NOT AVAI | The requested film, paper, or other media requested is not available on this printer. | Media supply not available on this camera. Queue stopped. Change camera. | Queue for this camera will be STOPPED/ Queue stopped |
| RIBBON ERROR | There is an unspecified problem with the print ribbon. | Error with print ribbon. | <None>/interact |
| SUPPLY EMPTY | The printer is out of film. | Camera out of film. | <None>/interact |
| SUPPLY LOW | The film supply is low. | Film supply low. | <None>/interact |
| UNKNOWN | There is an unspecified problem. | Unspecified problem with camera. | <None>/interact |

8.6.2 Additional DICOM Execution Status Information

Printer Status Info and Execution Status Info are defined terms and can therefore be extended or reduced by camera manufacturers. Therefore **syngo.via** shall be flexible.

If any other printer status info or execution status info is received (as described in Table 8.6.1, **syngo.via** will react as shown in the following table:

| Printer Status / Execution | Printer / Execution Status Info | Description | Message string visible in the Job status bar | Other action for syngo / camera symbol |
|-------------------------------|------------------------------------|---------------------------|--|---|
| WARNING | <any other> | <not defined status info> | Camera info: <status info> | <None>/Interact |
| FAILURE | <any other> | <not defined status info> | Camera info: <status info> Queue stopped. | Queue for this camera will be STOPPED/ Queue stopped |

8.7 syngo.via tasks

8.7.1 CT Grayscale image result of Perfusion Tasks

Table 8-5: CT Grayscale image result of CT Perfusion Tasks

| DICOM - Storage as CT Image , SOP Class UID = 1.2.840.10008.5.1.4.1.1.2 Image Type (0008,0008) Value 1 to 4 in all these result volumes is: DERIVED\SECONDARY\AXIAL\CT_SOM8 PERF Photometric Interpretation = MONOCHROME2 Bits allocated = 16,12,11 and Samples per Pixel = 1 | | | | | | | |
|--|----------------------|---------------------------------|--|-------------------------------------|------------------------------|--------------------------------|---|
| Task / Body Region | Calculation Model | Result Volumes - Full Name - | Image Type (0008,0008) - Value 5 - | Rescale Intercept (0028,1052) | Rescale Slope (0028,1053) | Rescale Type (0028,1054) | Proper unit is visible in the image comment (0020, 4000) |
| CT Neuro Perfusion + CT Body Perfusion + CT Myocardial Perfusion | Standard | Temporal MIP | MIP | -1024 | 1 | HU | HU |
| CT Neuro Perfusion + CT Body Perfusion + CT Myocardial Perfusion | Standard | Temporal Average | AVG | -1024 | 1 | HU | HU |
| CT Neuro Perfusion + CT Body Perfusion + CT Myocardial | Standard | Baseline | BASE | -1024 | 1 | HU | HU |

| DICOM - Storage as CT Image , SOP Class UID = 1.2.840.10008.5.1.4.1.1.2 Image Type (0008,0008) Value 1 to 4 in all these result volumes is: DERIVED\SECONDARY\AXIAL\CT_SOM8 PERF Photometric Interpretation = MONOCHROME2 Bits allocated = 16,12,11 and Samples per Pixel = 1 | | | | | | | |
|--|-------------------|------------------------------|------------------------------------|-------------------------------|---------------------------|--------------------------|--|
| Task / Body Region | Calculation Model | Result Volumes - Full Name - | Image Type (0008,0008) - Value 5 - | Rescale Intercept (0028,1052) | Rescale Slope (0028,1053) | Rescale Type (0028,1054) | Proper unit is visible in the image comment (0020, 4000) |
| Perfusion | | | | | | | |
| CT Neuro Perfusion + CT Body Perfusion | Standard | Time to Start | TTSM | -102.4 | 0.1 | US | s |
| CT Neuro Perfusion + CT Body Perfusion | Deconvolution | Time to Start | TTSD | -102.4 | 0.1 | US | s |
| CT Neuro Perfusion + CT Body Perfusion | Standard | Time to Peak | TTPM | -102.4 | 0.1 | US | s |
| CT Neuro Perfusion + CT Body Perfusion | Deconvolution | Time to Drain | TTDD | -102.4 | 0.1 | US | s |
| CT Neuro Perfusion + CT Body Perfusion + CT Myocardial Perfusion | Deconvolution | Mean Transit Time | MTTD | -102.4 | 0.1 | US | s |
| CT Neuro Perfusion + CT Body Perfusion | Deconvolution | TMax | TMAXD | -102.4 | 0.1 | US | s |
| CT Neuro Perfusion + CT Body Perfusion + CT Myocardial Perfusion | Deconvolution | Flow Extraction Product | FED | -102.4 | 0.1 | US | mL/100mL/min |
| CT Neuro Perfusion | Max. Slope | Cerebral Blood Flow | CBFM | -1024 | 1 | US | mL/100mL/min |
| CT Neuro Perfusion | Deconvolution | Cerebral Blood Flow | CBFD | -1024 | 1 | US | mL/100mL/min |
| CT Neuro Perfusion | Max. Enhancement | Cerebral Blood Volume | CBVM | -102.4 | 0.1 | US | mL/100mL |
| CT Neuro Perfusion | Deconvolution | Cerebral Blood Volume | CBVD | -102.4 | 0.1 | US | mL/100mL |
| CT Body Perfusion | Max. Slope | Blood Flow | BFM | -1024 | 1 | US | mL/100mL/min |
| CT Body Perfusion | Deconvolution | Blood Flow | BFD | -1024 | 1 | US | mL/100mL/min |
| CT Body Perfusion | Max. Enhancement | Blood Volume | BVM | -102.4 | 0.1 | US | mL/100mL |
| CT Body Perfusion | Patlak | Blood Volume | BVP | -102.4 | 0.1 | US | mL/100mL |
| CT Body Perfusion | Deconvolution | Blood Volume | BVD | -102.4 | 0.1 | US | mL/100mL |
| CT Body Perfusion | Patlak | Flow Extraction Product | FEP | -102.4 | 0.1 | US | mL/100mL/min |
| CT Body Perfusion | Patlak | Rsquare | RSQP | -1024 | 1 | US | % |
| CT Body Perfusion | Patlak | Residuals | RSDP | -102.4 | 0.1 | US | mL/100mL |
| CT Body Perfusion | Liver Model | Arterial Liver Perfusion | ALP | -1024 | 1 | US | mL/100mL/min |

| DICOM - Storage as CT Image , SOP Class UID = 1.2.840.10008.5.1.4.1.1.2 Image Type (0008,0008) Value 1 to 4 in all these result volumes is: DERIVED\SECONDARY\AXIAL\CT_SOM8 PERF Photometric Interpretation = MONOCHROME2 Bits allocated = 16,12,11 and Samples per Pixel = 1 | | | | | | | |
|--|--------------------------|------------------------------------|--|-------------------------------------|------------------------------|--------------------------------|---|
| Task / Body Region | Calculation Model | Result Volumes - Full Name - | Image Type (0008,0008) - Value 5 - | Rescale Intercept (0028,1052) | Rescale Slope (0028,1053) | Rescale Type (0028,1054) | Proper unit is visible in the image comment (0020, 4000) |
| CT Body Perfusion | Liver Model | Portal Venous Liver Perfusion | PVP | -1024 | 1 | US | mL/100mL/min |
| CT Body Perfusion | Liver Model | Hepatic Perfusion Index | HPI | -1024 | 1 | US | mL/100mL/min |
| CT Myocardial Perfusion | Max. Slope | Myocardial Blood Flow | MBF | -1024 | 1 | US | mL/100mL/min |
| CT Myocardial Perfusion | Max. Enhancement | Myocardial Blood Volume | MBV | -102.4 | 0.1 | US | mL/100mL |
| CT Myocardial Perfusion | Myocardial Deconvolution | Flow Extraction Product | FE | -102.4 | 0.1 | US | mL/100mL |
| CT Myocardial Perfusion | Myocardial Deconvolution | Perfused Capillary Blood Volume | PCBV | -102.4 | 0.1 | US | s |
| CT Myocardial Perfusion | Myocardial Deconvolution | Myocardial Blood Flow Corrected | MBFC | -1024 | 1 | US | mL/100mL |
| CT Myocardial Perfusion | Myocardial Deconvolution | Extravascular Extracellular Volume | EEV | -102.4 | 0.1 | US | mL/100mL |
| CT Myocardial Perfusion | Myocardial Deconvolution | Time to Peak | TTP | -102.4 | 0.1 | US | s |
| CT Myocardial Perfusion | Myocardial Deconvolution | Time to Start | TTS | -102.4 | 0.1 | US | mL/100mL/min |
| CT Myocardial Perfusion | Myocardial Deconvolution | Tissue Transit Time | TTT | -102.4 | 0.1 | US | mL/100mL/min |

Table 8-6: Enhanced CT image result of CT Perfusion Tasks

| DICOM - Storage as Enhanced CT Image , SOP Class UID = 1.2.840.10008.5.1.4.1.1.2.1 Image Type (0008,0008) and Frame Type (0008,9007) Value 1 to 3 in all these result volumes is: DERIVED\PRIMARY\PERFUSION Photometric Interpretation = MONOCHROME2 Bits allocated = 16,12,11 and Samples per Pixel = 1 | | | | | | | | | |
|---|-------------------|------------------------------|---|---|---|--|----------------------------|------------------------|--------------------------|
| Task / Body Region | Calculation Model | Result Volumes - Full Name - | Image Type (0008,0008) - Value 4 - Frame Type (0008,9007) - Value 4 - LUT Label (0040,9210) | Rescale Intercept (0028,1052) contained in (5200,9229) Sequence | Rescale Slope (0028,1053) contained in (5200,9229) Sequence | Rescale Type (0028,1054) contained in (5200,9229) Sequence | RWVM Intercept (0040,9224) | RWVM Slope (0040,9225) | Code Meaning (0008,0104) |
| CT Neuro Perfusion + CT Body Perfusion + CT Myocardial Perfusion | Standard | Temporal MIP | MIP | -1024 | 1 | HU | -1024 | 1 | HU |
| CT Neuro Perfusion + CT Body Perfusion + CT Myocardial Perfusion | Standard | Temporal Average | AVG | -1024 | 1 | HU | -1024 | 1 | HU |
| CT Neuro Perfusion + CT Body Perfusion + CT Myocardial Perfusion | Standard | Baseline | BASE | -1024 | 1 | HU | -1024 | 1 | HU |
| CT Neuro Perfusion + CT Body Perfusion | Standard | Time to Start | TTSM | -102.4 | 0.1 | US | -102.4 | 0.1 | s |
| CT Neuro Perfusion + CT Body Perfusion | Deconvolution | Time to Start | TTSD | -102.4 | 0.1 | US | -102.4 | 0.1 | s |
| CT Neuro Perfusion + CT Body Perfusion | Standard | Time to Peak | TTPM | -102.4 | 0.1 | US | -102.4 | 0.1 | s |
| CT Neuro Perfusion + CT Body Perfusion | Deconvolution | Time to Drain | TTDD | -102.4 | 0.1 | US | -102.4 | 0.1 | s |
| CT Neuro Perfusion + CT Body Perfusion + CT Myocardial Perfusion | Deconvolution | Mean Transit Time | MTTD | -102.4 | 0.1 | US | -102.4 | 0.1 | s |
| CT Neuro Perfusion + CT Body Perfusion | Deconvolution | TMax | TMAXD | -102.4 | 0.1 | US | -102.4 | 0.1 | s |
| CT Neuro Perfusion + CT Body Perfusion + CT Myocardial Perfusion | Deconvolution | Flow Extraction Product | FED | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100mL/min |
| CT Neuro Perfusion | Max. Slope | Cerebral Blood Flow | CBFM | -1024 | 1 | US | -1024 | 1 | mL/100mL/min |
| CT Neuro Perfusion | Deconvolution | Cerebral Blood Flow | CBFD | -1024 | 1 | US | -1024 | 1 | mL/100mL/min |
| CT Neuro Perfusion | Max. Enhancement | Cerebral Blood Volume | CBVM | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100mL |
| CT Neuro Perfusion | Deconvolution | Cerebral Blood Volume | CBVD | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100mL |

| DICOM - Storage as Enhanced CT Image , SOP Class UID = 1.2.840.10008.5.1.4.1.1.2.1 Image Type (0008,0008) and Frame Type (0008,9007) Value 1 to 3 in all these result volumes is: DERIVED\PRIMARY\PERFUSION Photometric Interpretation = MONOCHROME2 Bits allocated = 16,12,11 and Samples per Pixel = 1 | | | | | | | | | |
|---|--------------------------|------------------------------------|---|--|--|---|----------------------------|------------------------|--------------------------|
| Task / Body Region | Calculation Model | Result Volumes - Full Name - | Image Type (0008,0008) - Value 4 - Frame Type (0008,9007) - Value 4 - LUT Label (0040,9210) | Rescale Intercept (0028,1052) contained in (5200,9229) Sequence | Rescale Slope (0028,1053) contained in (5200,9229) Sequence | Rescale Type (0028,1054) contained in (5200,9229) Sequence | RWVM Intercept (0040,9224) | RWVM Slope (0040,9225) | Code Meaning (0008,0104) |
| CT Body Perfusion | Max. Slope | Blood Flow | BFM | -1024 | 1 | US | -1024 | 1 | mL/100m L/min |
| CT Body Perfusion | Deconvolution | Blood Flow | BFD | -1024 | 1 | US | -1024 | 1 | mL/100m L/min |
| CT Body Perfusion | Max. Enhancement | Blood Volume | BVM | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100m L |
| CT Body Perfusion | Patlak | Blood Volume | BVP | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100m L |
| CT Body Perfusion | Deconvolution | Blood Volume | BVD | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100m L |
| CT Body Perfusion | Patlak | Flow Extraction Product | FEP | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100m L/min |
| CT Body Perfusion | Patlak | Rsquare | RSQP | -1024 | 1 | US | -1024 | 1 | % |
| CT Body Perfusion | Patlak | Residuals | RSDP | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100m L |
| CT Body Perfusion | Liver Model | Arterial Liver Perfusion | ALP | -1024 | 1 | US | -1024 | 1 | mL/100m L/min |
| CT Body Perfusion | Liver Model | Portal Venous Liver Perfusion | PVP | -1024 | 1 | US | -1024 | 1 | mL/100m L/min |
| CT Body Perfusion | Liver Model | Hepatic Perfusion Index | HPI | -1024 | 1 | US | -1024 | 1 | mL/100m L/min |
| CT Myocardial Perfusion | Max. Slope | Myocardial Blood Flow | MBF | -1024 | 1 | US | -1024 | 1 | mL/100m L/min |
| CT Myocardial Perfusion | Max. Enhancement | Myocardial Blood Volume | MBV | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100m L |
| CT Myocardial Perfusion | Myocardial Deconvolution | Flow Extraction Product | FE | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100m L |
| CT Myocardial Perfusion | Myocardial Deconvolution | Perfused Capillary Blood Volume | PCBV | -102.4 | 0.1 | US | -102.4 | 0.1 | s |
| CT Myocardial Perfusion | Myocardial Deconvolution | Myocardial Blood Flow Corrected | MBFC | -1024 | 1 | US | -1024 | 1 | mL/100m L |
| CT Myocardial Perfusion | Myocardial Deconvolution | Extravascular Extracellular Volume | EEV | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100m L |
| CT Myocardial Perfusion | Myocardial Deconvolution | Time to Peak | TTP | -102.4 | 0.1 | US | -102.4 | 0.1 | s |
| CT Myocardial Perfusion | Myocardial Deconvolution | Time to Start | TTS | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100m L/min |
| CT Myocardial Perfusion | Myocardial Deconvolution | Tissue Transit Time | TTT | -102.4 | 0.1 | US | -102.4 | 0.1 | mL/100m L/min |

8.8 ANNEX A – syngo.Breast Care

8.8.1 syngo.Breast Care

The syngo.Breast Care application allows reviewing and reporting on mammography and breast tomosynthesis images.

8.8.1.1 SOP Specific Conformance to Viewing Application

The following SOP classes are recognized and displayed by the syngo.Breast Care software:

- Digital Mammography Image Storage – For Presentation: 1.2.840.10008.5.1.4.1.1.1.2

The following constraints must be met in order to recognize images as digital mammography:

Table 8-7: Requirements for Mammography Images

| Attribute Name | Tag | Constraint |
|---------------------|-------------|---------------------------------------|
| SOP class UID | (0008,0016) | Value = “1.2.840.10008.5.1.4.1.1.1.2” |
| Patient orientation | (0020,0020) | Must be present and valid. |

- Breast Tomosynthesis Images encoded as CT Image Storage: 1.2.840.10008.5.1.4.1.1.1.2

The following constraints must be met in order to recognize images as breast tomosynthesis slices:

Table 8-8: Requirements for Breast Tomosynthesis Image encoded as CT

| Attribute Name | Tag | Constraint (case insensitive) |
|---------------------------|-------------|---------------------------------------|
| SOP class UID | (0008,0016) | Value = “1.2.840.10008.5.1.4.1.1.1.2” |
| Manufacturer | (0008,0070) | Value = “SIEMENS” |
| Manufacturer’s model name | (0008,1090) | Value = “MAMMOMAT INSPIRATION” |
| Image orientation | (0020,0037) | Must be present and valid. |

- DICOM Breast Tomosynthesis Image Storage: 1.2.840.10008.5.1.4.1.1.13.1.3

Only data with Frame Anatomy Macro which includes the Frame Laterality (0020,9072) in Shared Functional Groups Sequence (5200,9229) (i.e. not in Per-frame Functional Groups Sequence (5200,9230)) are supported.

The following constraints must be met in order to recognize images as DICOM Breast Tomosynthesis:

Table 8-9: Requirements for DICOM Breast Tomosynthesis Images

| Attribute Name | Tag | Constraint (case insensitive) |
|----------------|-------------|--|
| SOP class UID | (0008,0016) | Value = “1.2.840.10008.5.1.4.1.1.13.1.3” |

For the three SOP classes Digital Mammography Image Storage – For Presentation, Breast Tomosynthesis Images encoded as CT Image Storage and DICOM Breast Tomosynthesis Image Storage, the following constraints must be met:

Table 8-10: Common Requirements for Mammography and Breast Tomosynthesis Images

| Attribute Name | Tag | Constraint |
|----------------------------|-------------|--|
| Pixel representation | (0028,0103) | Value = 0 |
| Bits allocated | (0028,0100) | Value = 8 or value = 16 |
| High bit | (0028,0102) | Bits stored in {8, 10, 12, 14, 15, 16} and bits stored = high bit + 1 |
| Bits stored | (0028,0101) | |
| Samples per pixel | (0028,0002) | Value = 1 |
| Photometric interpretation | (0028,0004) | Value = "MONOCHROME1" or Value = "MONOCHROME2" |

Only image data meeting all requirements is displayed correctly. If any constraints are violated, the image data may not be automatically displayed, displayed with reduced information or not be displayed at all. In this case a warning message is displayed to the user.

- Mammography CAD SR: 1.2.840.10008.5.1.4.1.1.88.50

The following constraints must be met in order to recognize images as mammography computer-aided detection structured reports:

Table 8-11: Requirements for Mammography CAD SR

| Attribute Name | Tag | Constraint (case insensitive) |
|---------------------|-------------|--|
| SOP class UID | (0008,0016) | Value = "1.2.840.10008.5.1.4.1.1.88.50" |
| Manufacturer | (0008,0070) | Supported values: "SIEMENS", "iCAD, Inc.", "VuCOMP" |
| Software Version(s) | (0018,1020) | The following software versions are supported per manufacturer: <ul style="list-style-type: none"> • "SIEMENS": "syngo MammoCAD" • "iCAD, Inc.": "7.2-H+", "Premier-D" • "VuCOMP": "CAD 2.0.0.0", "CAD 2.1.0.0" |

CAD structured reports of manufacturers or other software versions of the listed manufacturers may or may not be displayed correctly. A warning message is not displayed to the user in this case.

For CAD SRs meeting these constraints, only those single image findings are displayed that meet the following constraints:

| Concept Name | Code Sequence | Constraint (case insensitive) |
|----------------------|--|--|
| Single Image Finding | EV (111059, DCM, "Single Image Finding") | Supported values: <ul style="list-style-type: none"> • EV (F-01775, SRT, "Calcification Cluster") • EV (F-01775, SRT 1.1, "Calcification Cluster") • EV (F-01796, SRT, "Mammography breast density") • EV (F-01796, SRT 1.1, "Mammography breast density") • EV (F-01776, SRT, "Individual Calcification") (Only if not part of a calcification cluster) • EV (F-01776, SRT 1.1, "Individual Calcification") (Only if not part of a calcification cluster) • EV (F-01710, SRT, "Breast Composition") (regardless of rendering intent) |
| Rendering Intent | EV (111056, DCM, "Rendering Intent") | Value = EV (111150, DCM, "Presentation Required: Rendering device is expected to present") if single image finding is not EV (F-01710, SRT, "Breast Composition") |
| Outline | EV (111041, DCM, "Outline") | If single image finding is EV (F-01710, SRT, "Breast Composition"), the outline may or may not be present. For other single image findings, the value must be present and contain at least one point. |

8.8.1.2 IOD Contexts for Image Text

The following information is displayed as image text, if present.

The specified data is mandatory or optional as defined by the DICOM standard [1]. For not available data attributes, either nothing or "n/a." is displayed in the image text.

Table 8-12: DICOM Tags used for Image Text

| Attribute / Concept Name | Tag / Code Sequence | Comment |
|----------------------------------|---------------------|--------------------------------|
| Acquisition Date and Time | | |
| Acquisition Date | (0008,0022) | Fallback: Study date and time. |
| Acquisition Time | (0008,0032) | |

| Attribute / Concept Name | Tag / Code Sequence | Comment |
|-----------------------------------|---------------------|---|
| Study Date | (0008,0020) | Displayed if acquisition date and time are not set. In this case, a disclaimer message is also displayed. |
| Study Time | (0008,0020) | |
| Patient and Study Data | | |
| Accession Number | (0008,0050) | |
| Institution Name | (0008,0080) | |
| Institution Address | (0008,0081) | |
| Station Name | (0008,1010) | |
| Patient's Name | (0010,0010) | |
| Patient ID | (0010,0020) | |
| Patient's Birth Date | (0010,0030) | |
| Patient's Age | (0010,1010) | |
| Image Acquisition | | |
| Manufacturer | (0008,0070) | |
| Operator's Name | (0008,1070) | |
| Manufacturer's Model Name | (0008,1090) | |
| KVP | (0018,0060) | |
| Gantry ID | (0018,1008) | |
| Device Serial Number | (0018,1000) | |
| Exposure Time | (0018,1150) | |
| Exposure | (0018,1152) | |
| Software Versions | (0018,1020) | |
| Anode Target Material | (0018,1191) | |
| Body Part Thickness | (0018,11A0) | |
| Compression Force | (0018,11A2) | |
| Relative X-ray Exposure | (0018,1405) | |
| Positioner Primary Angle | (0018,1510) | |
| Sensitivity | (0018,6000) | |
| Detector ID | (0018,700A) | |
| Date of Last Detector Calibration | (0018,700C) | |
| Filter Material | (0018,7050) | |
| Image Comment | (0020,4000) | |
| Organ Dose | (0040,0316) | |
| Entrance Dose in mGy | (0040,8302) | |
| View and Laterality | | |
| View Code Sequence | (0054,0220) | If the View Code Sequence (0054,0220) or View Modifier Code |

| Attribute / Concept Name | Tag / Code Sequence | Comment |
|---|-----------------------------------|--|
| View Modifier Code Sequence | (0054,0222) | Sequence (0054,0222) contain invalid values, the view type may be displayed as “?”. |
| Image Laterality | (0020,0062) | If one of these tags is present but contains an invalid value, the software may fall back to unpaired (“U”). |
| Laterality | (0020,0060) | |
| Lookup Tables | | |
| LUT Explanation | (0028,3003) | Only one of both is used, depending on which LUT is used. |
| Window Explanation | (0028,1055) | |
| Window Center | (0028,1050) | |
| Window Width | (0028,1051) | |
| Measurements | | |
| Imager Pixel Spacing | (0018,1164) | Used for display of resolution and magnification factor. |
| Estimated Radiographic Magnification Factor | (0018,1114) | Variant A: If estimated radiographic magnification factor (0018,1114) is not available, distance source to patient (0018,1111) and detector (0018,1110) is used. |
| Distance Source to Patient | (0018,1111) | |
| Distance Source to Detector | (0018,1110) | |
| Pixel Spacing | (0028,0030) | Used for display of resolution and magnification factor. Variant B: Used if variant A fails. |
| Image Plane Pixel Spacing | (3002,0011) | Used for display of resolution and magnification factor. Variant C: Used if variants A and B fail. |
| Breast Tomosynthesis | | |
| Derivation Description | (0008,2111) | |
| Number of Frames | (0028,0008) | Used for display of total number of slices. |
| Frame Laterality | (0020,9072) | |
| Computer-Aided Detection | | |
| Manufacturer | (0008,0070) | Manufacturer of CAD SR |
| Software Version(s) | (0018,1020) | Software versions of CAD software which generated the CAD SR |
| Content Date | (0008,0023) | Content date of CAD SR |
| Content Time | (0008,0033) | Content time of CAD SR |
| Algorithm Name | EV(111001, DCM, “Algorithm Name”) | Algorithm names of the displayed single image findings. |
| Algorithm Version | EV (111003, DCM, | Algorithm versions of the displayed |

| Attribute / Concept Name | Tag / Code Sequence | Comment |
|--------------------------|---|---|
| | "Algorithm Version") | single image findings. |
| Breast Composition | EV (F-01710,SRT, "Breast composition") | Breast composition value of the breast composition single image finding (if present). |
| Glandular Tissue | EV (111046, DCM, "Percent Fibroglandular Tissue") | Glandular tissue value of the breast composition single image finding (if present). |
| Summary of Detections | EV (111064, DCM, "Summary of Detections") | |
| Summary of Analyses | EV (111065, DCM, "Summary of Analyses") | |
| Area | EV (G-A166, SNM3, „Area“) | If present for single image finding. |
| Long Axis | EV (G-A185, SNM3, "Long Axis") | If present for single image finding. |
| Number of Calcifications | EV (111038, DCM, "Number of Calcifications") | For calcification clusters, if present for single image finding. |
| Certainty of Finding | EV (111012, DCM, "Certainty of Finding") | If present for single image finding. |
| Distance from Nipple | EV (121242, DCM, "Distance from Nipple") | If present for single image finding. |
| Distance from Chest Wall | EV (121244", "DCM", "Distance from Chest Wall") | If present for single image finding. |