

Ginkgo CADx

DICOM Conformance Statement.

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This document is the Ginkgo CADx Conformance Statement for DICOM images and spectroscopy objects obtained over the network, from interchange media, or from files loaded from the local file system. This conformance statement covers both the free open core version and the license version and/or commercial extensions.

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1. COVER PAGE

- **Company Name:** MetaEmotion S.L.
- **Product Name:** Ginkgo CADx
- **Version:** 3.0.0
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2. CONFORMANCE STATEMENT OVERVIEW

Ginkgo CADx application framework supports querying a remote system for a list of DICOM objects that may then be retrieved to the local system. It also supports sending locally loaded images across the network to another system.

All storage SOP Classes defined as of DICOM 2002 can be received, stored and transmitted by the application, but only images and spectroscopy objects may be loaded and viewed. All single and multiframe with grayscale and RGB color images may be displayed.

Only hierarchical query and retrieval is supported.

Table 1: NETWORK SERVICES

| SOP Class | User of Service (SCU) | Provider of Service (SCP) |
|---|-----------------------|---------------------------|
| Transfer | | |
| HardcopyGrayscaleImageStorage | Yes | Yes |
| HardcopyColorImageStorage | Yes | Yes |
| ComputedRadiographyImageStorage | Yes | Yes |
| DigitalXRayImageStorageForPresentation | Yes | Yes |
| DigitalXRayImageStorageForProcessing | Yes | Yes |
| DigitalMammographyXRayImageStorageForPresentation | Yes | Yes |
| DigitalMammographyXRayImageStorageForProcessing | Yes | Yes |
| DigitalIntraOralXRayImageStorageForPresentation | Yes | Yes |
| DigitalIntraOralXRayImageStorageForProcessing | Yes | Yes |
| CTImageStorage | Yes | Yes |
| EnhancedCTImageStorage | Yes | Yes |
| UltrasoundMultiframeImageStorage | Yes | Yes |
| RetiredUltrasoundMultiframeImageStorage | Yes | Yes |
| MRImageStorage | Yes | Yes |
| EnhancedMRImageStorage | Yes | Yes |
| MRSpectroscopyStorage | Yes | Yes |
| EnhancedMRColorImageStorage | Yes | Yes |
| UltrasoundImageStorage | Yes | Yes |
| EnhancedUSVolumeStorage | Yes | Yes |
| SecondaryCaptureImageStorage | Yes | Yes |
| MultiframeSingleBitSecondaryCaptureImageStorage | Yes | Yes |
| MultiframeGrayscaleByteSecondaryCaptureImageStorage | Yes | Yes |
| MultiframeGrayscaleWordSecondaryCaptureImageStorage | Yes | Yes |

| SOP Class | User of Service (SCU) | Provider of Service (SCP) |
|--|------------------------------|----------------------------------|
| MultiframeTrueColorSecondaryCaptureImageStorage | Yes | Yes |
| XRayRadiofluoroscopicImageStorage | Yes | Yes |
| XRayAngiographicImageStorage | Yes | Yes |
| EnhancedXAImageStorage | Yes | Yes |
| EnhancedXRFImageStorage | Yes | Yes |
| XRay3DAngiographicImageStorage | Yes | Yes |
| NuclearMedicineImageStorage | Yes | Yes |
| RawDataStorage | Yes | Yes (Store only) |
| VLEndoscopicImageStorage | Yes | Yes |
| VideoEndoscopicImageStorage | Yes | Yes |
| VLMicroscopicImageStorage | Yes | Yes |
| VideoMicroscopicImageStorage | Yes | Yes |
| VLSlideCoordinatesMicroscopicImageStorage | Yes | Yes |
| VLPhotographicImageStorage | Yes | Yes |
| VideoPhotographicImageStorage | Yes | Yes |
| PositronEmissionTomographyImageStorage | Yes | Yes |
| RTImageStorage | Yes | Yes (Store only) |
| GrayscaleSoftcopyPresentationStateStorage | Yes | Yes |
| BasicTextSRStorage | Yes | Yes (Store only) |
| EnhancedSRStorage | Yes | Yes (Store only) |
| ComprehensiveSRStorage | Yes | Yes (Store only) |
| KeyObjectSelectionDocumentStorage | Yes | Yes (Store only) |
| SecondaryCaptureImageStorage | Yes | Yes |
| ArterialPulseWaveformStorage | Yes | Yes |
| RespiratoryWaveformStorage | Yes | Yes |
| HemodynamicWaveformStorage | Yes | Yes |
| TwelveLeadECGWaveformStorage | Yes | Yes |
| GeneralECGWaveformStorage | Yes | Yes |
| AmbulatoryECGWaveformStorage | Yes | Yes |
| CardiacElectrophysiologyWaveformStorage | Yes | Yes |
| Query/Retrieve | | |
| FIND Patient Root Query/Retrieve Information Model | Yes | No |
| FIND Study Root Query/Retrieve Information Model | Yes | No |

| SOP Class | User of Service (SCU) | Provider of Service (SCP) |
|--|-----------------------|---------------------------|
| GET Patient Root Query/Retrieve Information Model | Yes | No |
| GET Study Root Query/Retrieve Information Model | Yes | No |
| MOVE Patient Root Query/Retrieve Information Model | Yes | No |
| MOVE Study Root Query/Retrieve Information Model | Yes | No |
| Workflow Management | | |
| FIND Modality Worklist Information Model | Yes[GP] | No |
| Print Management | | |
| Grayscale Print Management Meta | Yes[GP] | No |
| Color Print Management Meta | | |
| Presentation LUT | No | No |
| Printer Configuration | Yes[GP] | No |
| Print Job | Yes[GP] | No |
| Basic Annotation | No | No |
| Notes, Reports, Measurements Transfer | | |
| N/A | N/A | N/A |

Table 2: TRANSFER SYNTAXES

| Transfer Syntax | Category |
|---|----------|
| LittleEndianImplicitTransferSyntax | Basic |
| LittleEndianExplicitTransferSyntax | Basic |
| BigEndianExplicitTransferSyntax | Basic |
| DeflatedExplicitVRLittleEndianTransferSyntax | Basic |
| JPEGProcess1TransferSyntax | Image |
| JPEGProcess2_4TransferSyntax | Image |
| JPEGProcess14TransferSyntax | Image |
| JPEGProcess14SV1TransferSyntax | Image |
| JPEGLSLosslessTransferSyntax | Image |
| JPEGLSLossyTransferSyntax | Image |
| JPEG2000LosslessOnlyTransferSyntax | Image |
| JPEG2000TransferSyntax | Image |
| JPEG2000Part2MulticomponentImageCompressionLosslessOnlyTransferSyntax | Image |

| | |
|---|-------|
| JPEG2000Part2MulticomponentImageCompressionTransferSyntax | Image |
| RLELosslessTransferSyntax | Image |
| MPEG2MainProfileAtMainLevelTransferSyntax | Video |
| MPEG2MainProfileAtHighLevelTransferSyntax | Video |
| MPEG4HighProfileLevel4_1TransferSyntax | Video |
| MPEG4BDcompatibleHighProfileLevel4_1TransferSyntax | Video |

Table 3: UID VALUES

| UID Name | UID Value | Category |
|--|-------------------------------|----------|
| HardcopyGrayscaleImageStorage | 1.2.840.10008.5.1.1.29 | Storage |
| HardcopyColorImageStorage | 1.2.840.10008.5.1.1.30 | Storage |
| ComputedRadiographyImageStorage | 1.2.840.10008.5.1.4.1.1.1 | Storage |
| DigitalXRayImageStorageForPresentation | 1.2.840.10008.5.1.4.1.1.1.1 | Storage |
| DigitalXRayImageStorageForProcessing | 1.2.840.10008.5.1.4.1.1.1.1.1 | Storage |
| DigitalMammographyXRayImageStorageFor Presentation | 1.2.840.10008.5.1.4.1.1.1.2 | Storage |
| DigitalMammographyXRayImageStorageFor Processing | 1.2.840.10008.5.1.4.1.1.1.2.1 | Storage |
| DigitalIntraOralXRayImageStorageForPresentation | 1.2.840.10008.5.1.4.1.1.1.3 | Storage |
| DigitalIntraOralXRayImageStorageForProcessing | 1.2.840.10008.5.1.4.1.1.1.3.1 | Storage |
| CTImageStorage | 1.2.840.10008.5.1.4.1.1.2 | Storage |
| EnhancedCTImageStorage | 1.2.840.10008.5.1.4.1.1.2.1 | Storage |
| UltrasoundMultiframeImageStorage | 1.2.840.10008.5.1.4.1.1.3.1 | Storage |
| RetiredUltrasoundMultiframeImageStorage | 1.2.840.10008.5.1.4.1.1.3 | Storage |
| MRImageStorage | 1.2.840.10008.5.1.4.1.1.4 | Storage |
| EnhancedMRImageStorage | 1.2.840.10008.5.1.4.1.1.4.1 | Storage |
| MRSpectroscopyStorage | 1.2.840.10008.5.1.4.1.1.4.2 | Storage |
| EnhancedMRColorImageStorage | 1.2.840.10008.5.1.4.1.1.4.3 | Storage |
| UltrasoundImageStorage | 1.2.840.10008.5.1.4.1.1.6.1 | Storage |
| EnhancedUSVolumeStorage | 1.2.840.10008.5.1.4.1.1.6.2 | Storage |
| SecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7 | Storage |
| MultiframeSingleBitSecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7.1 | Storage |
| MultiframeGrayscaleByteSecondaryCaptureImage Storage | 1.2.840.10008.5.1.4.1.1.7.2 | Storage |
| MultiframeGrayscaleWordSecondaryCaptureImage Storage | 1.2.840.10008.5.1.4.1.1.7.3 | Storage |

| UID Name | UID Value | Category |
|---|----------------------------------|----------|
| MultiframeTrueColorSecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7.4 | Storage |
| XRayRadiofluoroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.12.2 | Storage |
| XRayAngiographicImageStorage | 1.2.840.10008.5.1.4.1.1.12.1 | Storage |
| EnhancedXAImageStorage | 1.2.840.10008.5.1.4.1.1.12.1.1 | Storage |
| EnhancedXRFImageStorage | 1.2.840.10008.5.1.4.1.1.12.2.1 | Storage |
| XRay3DAngiographicImageStorage | 1.2.840.10008.5.1.4.1.1.13.1.1 | Storage |
| NuclearMedicineImageStorage | 1.2.840.10008.5.1.4.1.1.20 | Storage |
| RawDataStorage | 1.2.840.10008.5.1.4.1.1.66 | Storage |
| VLEndoscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.1 | Storage |
| VideoEndoscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | Storage |
| VLMicroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.2 | Storage |
| VideoMicroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 | Storage |
| VLSlideCoordinatesMicroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.3 | Storage |
| VLPhotographicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.4 | Storage |
| VideoPhotographicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 | Storage |
| PositronEmissionTomographyImageStorage | 1.2.840.10008.5.1.4.1.1.128 | Storage |
| RTImageStorage | 1.2.840.10008.5.1.4.1.1.481.1 | Storage |
| GrayscaleSoftcopyPresentationStateStorage | 1.2.840.10008.5.1.4.1.1.11.1 | Storage |
| BasicTextSRStorage | 1.2.840.10008.5.1.4.1.1.88.11 | Storage |
| EnhancedSRStorage | 1.2.840.10008.5.1.4.1.1.88.22 | Storage |
| ComprehensiveSRStorage | 1.2.840.10008.5.1.4.1.1.88.33 | Storage |
| KeyObjectSelectionDocumentStorage | 1.2.840.10008.5.1.4.1.1.88.59 | Storage |
| SecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7 | Storage |
| ArterialPulseWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.5.1 | Storage |
| RespiratoryWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.6.1 | Storage |
| HemodynamicWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.2.1 | Storage |
| TwelveLeadECGWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.1.1 | Storage |
| GeneralECGWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.1.2 | Storage |
| AmbulatoryECGWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.1.3 | Storage |
| CardiacElectrophysiologyWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.3.1 | Storage |
| BasicGrayscalePrintManagementMetaSOPClass | 1.2.840.10008.5.1.1.9 | Print |
| BasicFilmSessionSOPClass | 1.2.840.10008.5.1.1.1 | Print |
| BasicFilmBoxSOPClass | 1.2.840.10008.5.1.1.2 | Print |

| UID Name | UID Value | Category |
|--|-------------------------|-----------------|
| BasicGrayscaleImageBoxSOPClass | 1.2.840.10008.5.1.1.4 | Print |
| PrinterSOPClass | 1.2.840.10008.5.1.1.16 | Print |
| PrinterSOPInstance | 1.2.840.10008.5.1.1.17 | Print |
| LittleEndianImplicitTransferSyntax | 1.2.840.10008.1.2 | Transfer Syntax |
| LittleEndianExplicitTransferSyntax | 1.2.840.10008.1.2.1 | Transfer Syntax |
| BigEndianExplicitTransferSyntax | 1.2.840.10008.1.2.2 | Transfer Syntax |
| DeflatedExplicitVRLittleEndianTransferSyntax | 1.2.840.10008.1.2.1.99 | Transfer Syntax |
| JPEGProcess1TransferSyntax | 1.2.840.10008.1.2.4.50 | Transfer Syntax |
| JPEGProcess2_4TransferSyntax | 1.2.840.10008.1.2.4.51 | Transfer Syntax |
| JPEGProcess10_12TransferSyntax | 1.2.840.10008.1.2.4.55 | Transfer Syntax |
| JPEGProcess14TransferSyntax | 1.2.840.10008.1.2.4.57 | Transfer Syntax |
| JPEGProcess14SV1TransferSyntax | 1.2.840.10008.1.2.4.70 | Transfer Syntax |
| JPEGLSLosslessTransferSyntax | 1.2.840.10008.1.2.4.80 | Transfer Syntax |
| JPEGLSLossyTransferSyntax | 1.2.840.10008.1.2.4.81 | Transfer Syntax |
| JPEG2000LosslessOnlyTransferSyntax | 1.2.840.10008.1.2.4.90 | Transfer Syntax |
| JPEG2000TransferSyntax | 1.2.840.10008.1.2.4.91 | Transfer Syntax |
| JPEG2000Part2MulticomponentImageCompression LosslessOnlyTransferSyntax | 1.2.840.10008.1.2.4.92 | Transfer Syntax |
| JPEG2000Part2MulticomponentImageCompression TransferSyntax | 1.2.840.10008.1.2.4.93 | Transfer Syntax |
| RLELosslessTransferSyntax | 1.2.840.10008.1.2.5 | Transfer Syntax |
| MPEG2MainProfileAtMainLevelTransferSyntax | 1.2.840.10008.1.2.4.100 | Transfer Syntax |
| MPEG2MainProfileAtHighLevelTransferSyntax | 1.2.840.10008.1.2.4.101 | Transfer |

| UID Name | UID Value | Category |
|--|-------------------------|-----------------|
| | | Syntax |
| MPEG4HighProfileLevel4_1TransferSyntax | 1.2.840.10008.1.2.4.102 | Transfer Syntax |
| MPEG4BDcompatibleHighProfileLevel4_1TransferSyntax | 1.2.840.10008.1.2.4.103 | Transfer Syntax |

Table 4: MEDIA SERVICES

| Media Storage Application Profile | Identifier | Write Files (FSC or FSU) | Read files (FSR) |
|---|---------------------|--------------------------|------------------|
| Compact Disk - Recordable | | | |
| General Purpose CD-R Interchange | STD-GEN-CD | Yes [GP] | Yes |
| General Purpose Secure CD-R Interchange | STD-GEN-SEC-CD | - | No |
| DVD | | | |
| General Purpose Interchange on DVD-RAM Media | STD-GEN-DVD-RAM | Yes [GP] | Yes |
| General Purpose Secure Interchange on DVD-RAM Media | STD-GEN-SEC-DVD-RAM | - | No |
| USB | | | |
| General Purpose USB and Flash Memory | STD-GEN-USB | Yes [GP] | Yes |

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4. INTRODUCTION

4.1. REVISION HISTORY

Table 5: REVISION HISTORY

| Document Version | Date of Issue | Author | Description |
|------------------|--------------------|------------------------|--|
| 1.1 | February, 08, 2012 | MetaEmotion HealthCare | Final version |
| 1.2 | March, 23, 2012 | MetaEmotion HealthCare | PDF IOD, Generated SOPs included. |
| 1.3 | April, 20, 2012 | MetaEmotion HealthCare | Fixes, Updates, Printing support included. |
| 1.4 | June, 18, 2012 | MetaEmotion HealthCare | Updated for new workstation behavior. |

4.2. AUDIENCE

The reader of this document is concerned with software design and/or system integration issues, so it is assumed that the reader of this document is familiar with the DICOM 3.0 Standard and with the terminology and concepts which are used in this standard.

This document specifies the compliance of Ginkgo CADx support to the DICOM 3.0 standard.

4.3. REMARKS

The author (MetaEmotion S.L.) provides no warranty without explicit link contract complained on software maintaining and/or commercial support services.

Notes:

[GP] Only available with Ginkgo CADx Pro [distribution](http://ginkgo-cadx.com/en/extensions/ginkgo-cadx-pro/).

4.4. DEFINITIONS, TERMS AND ABBREVIATIONS

Table 6: DEFINITIONS, TERMS AND ABBREVIATIONS

| Term/Abbreviation | Definition |
|-------------------|--|
| AE | Application Entity |
| AET | Application Entity Title |
| ANSI | American National Standards Institute |
| DICOM | Digital Imaging and Communications in Medicine |
| DIMSE-C | DICOM Message Service Element-Composite |
| DIMSE-N | DICOM Message Service Element-Normalized |

| Term/Abbreviation | Definition |
|--------------------------|--|
| FSC | File Set Creator. |
| FSR | File Set Reader. |
| FSU | File Set Updater. |
| HL7 | Health Level Seven (Association). |
| IHE | Integrating the Healthcare Enterprise (Association). |
| NEMA | National Electrical Manufacturers Association. |
| PACS | Picture Archiving and Communication System. |
| PDU | Protocol Data Unit. |
| SCP | Service Class Provider. |
| SCU | Service Class User. |
| SOP | Service Object Pair. |
| UID | Unique Identifier. |
| WADO | Web Access to DICOM Objects. |

4.5. REFERENCES

- **HL7**, <http://www.hl7.org/>
- **IHE**, <http://www.ihe.net/>
- **NEMA**, <http://www.nema.org/>

5. NETWORKING

5.1. IMPLEMENTATION MODEL

5.1.1. Application Data Flow

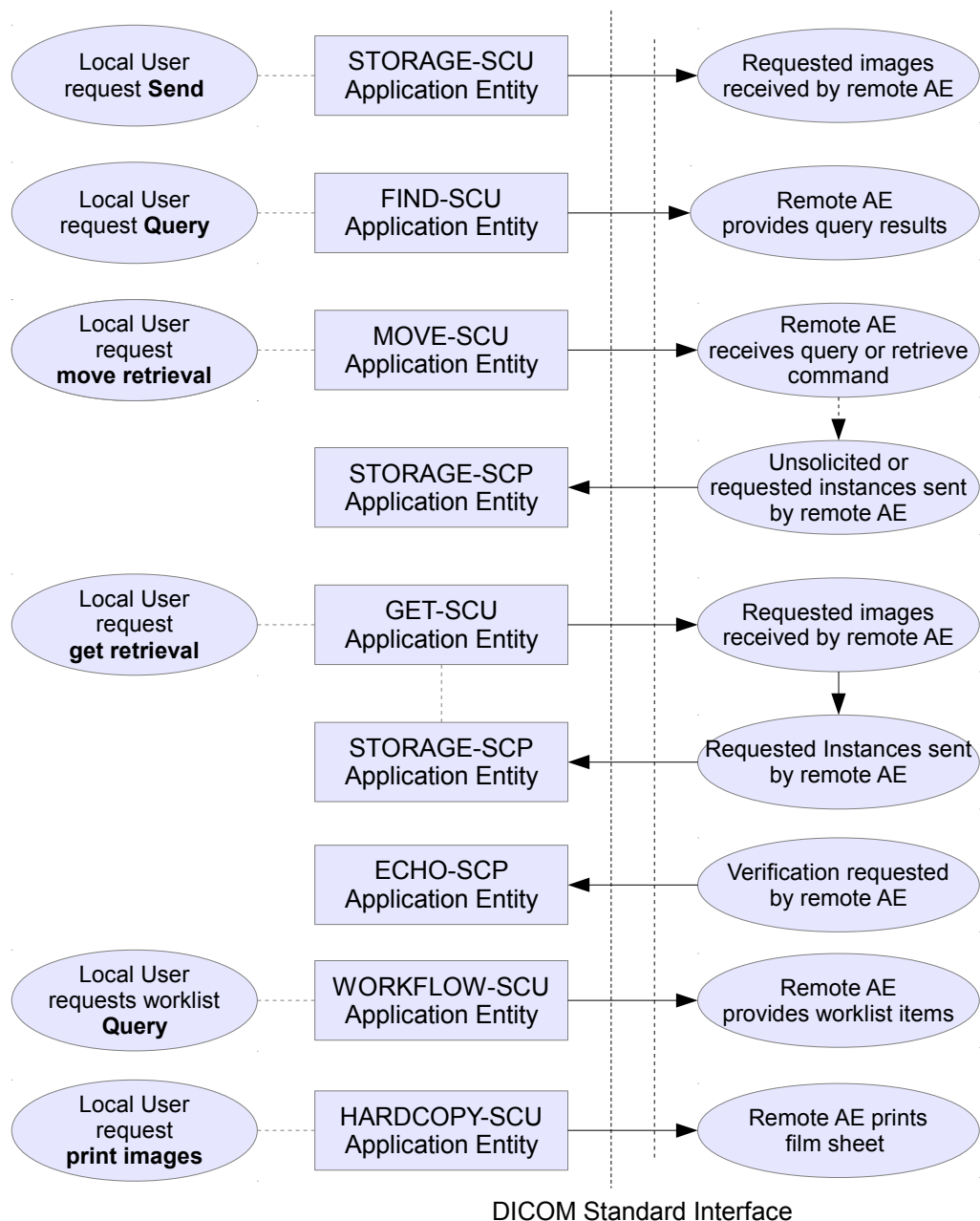


Figure 1: IMPLEMENTATION MODEL

The application is a single pure and native C++ application that provides both a user interface, internal database and network listener that spawns additional threads as when requiring SCUs are initialized to handle incoming connections, as well as media support.

Conceptually, the network services may be modeled as the following separate AEs though in fact all the AEs share a single (configurable) AE Title:

- ECHO-SCP, which response to on-demand verification requests.
- STORAGE-SCP, which receives incoming images and other composite instances.
- STORAGE-SCU, which sends outbound images and other composite instances.
- FIND-SCU which queries remote AEs for lists of studies, series and instances.
- MOVE-SCU, which retrieves selected studies, series or instances in a P2P strategy.
- GET-SCU, which retrieves selected studies, series or instances in same association, in a STORE Request sequence.
- WORKFLOW-SCU [GP] , which queries remote AEs for list worklist entries.
- HARDCOPY-SCU [GP] , which prints images on a remote AE (Printer). It is associated with the local real-world activity “Film Images”. “Film Images” creates a print-job within the print queue containing one or more virtual film sheets composed from images selected by the user.

The Application Entities (AEs) SCP & SCU detailed in the application data flow diagram are all included in the Ginkgo CADx Framework. They may be invoked multiple times and the instances may operate simultaneously and asynchronously.

5.1.2. Functional Definition of AE's

5.1.2.1. ECHO-SCP

Ginkgo CADx Framework can accept C-ECHO associations at any time.

ECHO-SCP waits in the background for connections, will accept associations with Presentation Context for SOP Class of the Verification Service Class and will respond successfully to any of these requests.

5.1.2.2. STORAGE-SCP

Ginkgo CADx Framework can accept C-ECHO associations at any time. The preferred presentation contexts are specified depending on configured in the dicom conformance XML file.

STORAGE-SCP waits in the background for connections, will accept associations with Presentation Context for SOP Classes of the Storage Service Class. If any of the instance received are duplicated (same SOP Instance UID), they could be discarded by user interaction. Otherwise, it will store the received instances to the local database there they may subsequently be listed and viewed through the user interface.

They are no restrictions based on the AETitle.

5.1.2.3. STORAGE-SCU

Ginkgo CADx Framework can send DICOM objects through C-STORE association to a preconfigured AE. The proposed presentation contexts are specified depending on configured in the dicom conformance XML file.

5.1.2.4. FIND-SCU

Ginkgo CADx can query a for patients, studies, series and images at PATIENT, STUDY, SERIES and IMAGE levels.

FIND-SCU is activated through:

- User interface interaction, querying a specified preconfigured AE. Queries are performed at STUDY level at first query. Refined queries deeps at SERIES level for selected study.
- XML integration workflows. Queries are performed at arbitrary user specified level. In most cases: STUDY level .

IMAGE level is normally not used.

5.1.2.5. MOVE-SCU

MOVE-SCU is activated through the user interface when user selects a study or serie for retrieval and AE configuration is set with MOVE option.

Depending on AE explicit configuration, MOVE-SCU retrieve is performed at STUDY or SERIES level.

When SERIES level mode is set in AE configuration, complete study retrievals are recursively performed at SERIES level retrievals.

5.1.2.6. GET-SCU

GET-SCU is activated through the user interface when user selects a study or serie for retrieval and AE configuration is set with GET option.

Depending on AE explicit configuration, GET-SCU retrieve is performed at STUDY or SERIES level.

When SERIES level mode is set in AE configuration, complete study retrievals are recursively performed at SERIES level retrievals.

When GET-SCU is performed, Ginkgo CADx Framework expects to receive sequential C-STORE request in the same association, so no generic STORAGE-SCP is explicitly called.

5.1.2.7. WORKFLOW-SCU

Ginkgo CADx Pro distribution [GP] provides querying Modality Worklists.

WORKFLOW-SCU is activated through:

- User interface interaction, querying a specified AE. Queries are performed with an implicit parameter (ScheduledStationAETitle matching Ginkgo CADx local's AE) as well as many configurable ones as date range and status.

5.1.2.8. HARDCOPY-SCU

Ginkgo CADx Pro distribution [GP] also provides printing grayscale images.

The HARDCOPY-SCU is always activated by a an explicit request from the user interface. An association is established with the printer and the printer's status determined. If the printer is operating normally, the film sheets described within the print-job will be printed. Changes in printer

status will be detected (e.g. out of film) and reported to the user. If the printer is not operating normally, the print-job will set to an error state and can be restarted by the user via the user interface.

5.1.3. Sequencing of Real World Activities

Ginkgo CADx Framework allows to invoke one or more operations asynchronously, although any unrequested SCP invocation is not allowed.

The parallelization is limited to one association type at a time by Ginkgo CADx Framework. There is no limit on derived incoming association concurrency.

5.2. AE SPECIFICATIONS:

The allowed Transfer Syntax for each presentation context is dependant on Ginkgo CADx Framework configuration through conformance.xml file.

The negotiated transfer syntaxes are grouped in SOP Classes and storage related negotiations ones are grouped by modality at upper level.

5.2.1. ECHO-SCP

5.2.1.1. SOP Classes

ECHO-SCP provides Standard Conformance to the following SOP Classes.

Table 7: SOP CLASSES SUPPORTED BY ECHO-SCP

| SOP Class Name | SOP Class UID | SCU | SCP |
|------------------------|-------------------|-----|-----|
| Verification SOP Class | 1.2.840.10008.1.1 | No | Yes |

5.2.1.2. Association Policies

5.2.1.3. General

ECHO-SCP accepts but never initiates associations.

Table 8: MAXIMUM PDU SIZE RECEIVED AS SCP FOR ECHO-SCP

| | |
|---------------------------|-----------|
| Maximum PDU size received | Unlimited |
|---------------------------|-----------|

5.2.1.3.1. Number of Associations.

Table 9: NUMBER OF ASSOCIATIONS AS SCP FOR ECHO-SCP

| | |
|---|-----------|
| Maximum number of simultaneous associations | Unlimited |
|---|-----------|

5.2.1.3.2. Asynchronous Nature

ECHO-SCP will only allow a single outstanding operation on an Association. Therefore, ECHO-SCP will not perform asynchronous operations window negotiation.

5.2.1.3.3. Implementation Identifying Information

Table 10: DICOM IMPLEMENTATION CLASS AND VERSION FOR ECHO-SCP

| | |
|------------------------------------|-----------------------------|
| Implementation Class UID | 1.2.276.0.7230010.3.0.3.6.0 |
| Implementation Version Name | OFFIS_DCMTK_360 |

5.2.1.4. Association Initiation Policy

ECHO-SCP does not initiate associations.

5.2.1.5. Association Acceptance Policy

When ECHO-SCP accepts an association, it will respond to echo requests. If the Called AE Title does not match the pre-configured AE Title shared by all the SCPs of the application, the association will be rejected.

5.2.1.5.1. Activity – Receive Echo Request

5.2.1.5.1.1. Description and Sequencing of Activities

5.2.1.5.1.2. Accepted Presentation Contexts

Table 11: ACCEPTABLE PRESENTATION CONTEXTS FOR ECHO-SCP

| Presentation Context Table | | | | | |
|----------------------------|-------------------|---------------------------|---------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name | UID | | |
| Verification | 1.2.840.10008.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCP | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCP | None |

5.2.1.5.1.3. Extended Negotiation

No extended negotiation is performed.

5.2.1.5.1.4. SOP Specific Conformance

5.2.1.5.1.4.1. SOP Specific Conformance to Verification SOP Class

ECHO-SCP provides standard conformance to the Verification Service Class.

5.2.1.5.1.4.2. Presentation Context Acceptance Criterion

ECHO-SCP will always accept any Presentation Context for the supported SOP Classes with the

supported Transfer Syntaxes. More than one proposed Presentation Context will be accepted for the same Abstract Syntax if the Transfer Syntax is supported, whether or not it is the same as another Presentation Context.

5.2.1.5.1.4.3. Transfer Syntax Selection Policies

ECHO-SCP prefers explicit Transfer Syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Transfer Syntax:

- a) First encountered explicit Transfer Syntax.

ECHO-SCP will accept duplicate Presentation Contexts, that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same priority for selecting a Transfer Syntax for each.

5.2.2. STORAGE-SCP

5.2.2.1. SOP Classes

STORAGE-SCP provides Standard Conformance to the following SOP Classes.

Table 12: SOP CLASSES SUPPORTED BY STORAGE-SCP

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|-------------------------------|-----|-----|
| HardcopyGrayscaleImageStorage | 1.2.840.10008.5.1.1.29 | No | Yes |
| HardcopyColorImageStorage | 1.2.840.10008.5.1.1.30 | No | Yes |
| ComputedRadiographyImageStorage | 1.2.840.10008.5.1.4.1.1.1 | No | Yes |
| DigitalXRayImageStorageForPresentation | 1.2.840.10008.5.1.4.1.1.1.1 | No | Yes |
| DigitalXRayImageStorageForProcessing | 1.2.840.10008.5.1.4.1.1.1.1.1 | No | Yes |
| DigitalMammographyXRayImageStorageForPresentation | 1.2.840.10008.5.1.4.1.1.1.2 | No | Yes |
| DigitalMammographyXRayImageStorageForProcessing | 1.2.840.10008.5.1.4.1.1.1.2.1 | No | Yes |
| DigitalIntraOralXRayImageStorageForPresentation | 1.2.840.10008.5.1.4.1.1.1.3 | No | Yes |
| DigitalIntraOralXRayImageStorageForProcessing | 1.2.840.10008.5.1.4.1.1.1.3.1 | No | Yes |
| CTImageStorage | 1.2.840.10008.5.1.4.1.1.2 | No | Yes |
| EnhancedCTImageStorage | 1.2.840.10008.5.1.4.1.1.2.1 | No | Yes |
| UltrasoundMultiframeImageStorage | 1.2.840.10008.5.1.4.1.1.3.1 | No | Yes |
| RetiredUltrasoundMultiframeImageStorage | 1.2.840.10008.5.1.4.1.1.3 | No | Yes |
| MRImageStorage | 1.2.840.10008.5.1.4.1.1.4 | No | Yes |
| EnhancedMRImageStorage | 1.2.840.10008.5.1.4.1.1.4.1 | No | Yes |

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|----------------------------------|------------|------------|
| MRSpectroscopyStorage | 1.2.840.10008.5.1.4.1.1.4.2 | No | Yes |
| EnhancedMRColorImageStorage | 1.2.840.10008.5.1.4.1.1.4.3 | No | Yes |
| UltrasoundImageStorage | 1.2.840.10008.5.1.4.1.1.6.1 | No | Yes |
| EnhancedUSVolumeStorage | 1.2.840.10008.5.1.4.1.1.6.2 | No | Yes |
| SecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7 | No | Yes |
| MultiframeSingleBitSecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7.1 | No | Yes |
| MultiframeGrayscaleByteSecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7.2 | No | Yes |
| MultiframeGrayscaleWordSecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7.3 | No | Yes |
| MultiframeTrueColorSecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7.4 | No | Yes |
| XRayRadiofluoroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.12.2 | No | Yes |
| XRayAngiographicImageStorage | 1.2.840.10008.5.1.4.1.1.12.1 | No | Yes |
| EnhancedXAImageStorage | 1.2.840.10008.5.1.4.1.1.12.1.1 | No | Yes |
| EnhancedXRFImageStorage | 1.2.840.10008.5.1.4.1.1.12.2.1 | No | Yes |
| XRay3DAngiographicImageStorage | 1.2.840.10008.5.1.4.1.1.13.1.1 | No | Yes |
| NuclearMedicineImageStorage | 1.2.840.10008.5.1.4.1.1.20 | No | Yes |
| RawDataStorage | 1.2.840.10008.5.1.4.1.1.66 | No | Yes |
| VLEndoscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.1 | No | Yes |
| VideoEndoscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | No | Yes |
| VLMicroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.2 | No | Yes |
| VideoMicroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 | No | Yes |
| VLSlideCoordinatesMicroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.3 | No | Yes |
| VLPhotographicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.4 | No | Yes |
| VideoPhotographicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 | No | Yes |
| PositronEmissionTomographyImageStorage | 1.2.840.10008.5.1.4.1.1.128 | No | Yes |
| RTImageStorage | 1.2.840.10008.5.1.4.1.1.481.1 | No | Yes |
| GrayscaleSoftcopyPresentationStateStorage | 1.2.840.10008.5.1.4.1.1.11.1 | No | Yes |
| BasicTextSRStorage | 1.2.840.10008.5.1.4.1.1.88.11 | No | Yes |
| EnhancedSRStorage | 1.2.840.10008.5.1.4.1.1.88.22 | No | Yes |
| ComprehensiveSRStorage | 1.2.840.10008.5.1.4.1.1.88.33 | No | Yes |
| KeyObjectSelectionDocumentStorage | 1.2.840.10008.5.1.4.1.1.88.59 | No | Yes |

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|-------------------------------|-----|-----|
| SecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7 | No | Yes |
| ArterialPulseWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.5.1 | No | Yes |
| RespiratoryWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.6.1 | No | Yes |
| HemodynamicWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.2.1 | No | Yes |
| TwelveLeadECGWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.1.1 | No | Yes |
| GeneralECGWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.1.2 | No | Yes |
| AmbulatoryECGWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.1.3 | No | Yes |
| CardiacElectrophysiologyWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.3.1 | No | Yes |

5.2.2.2. Association Policies

5.2.2.3. General

STORAGE-SCP accepts but never initiates associations.

Table 13: MAXIMUM PDU SIZE RECEIVED AS SCP FOR STORAGE-SCP

| | |
|---------------------------|-----------|
| Maximum PDU size received | Unlimited |
|---------------------------|-----------|

5.2.2.3.1. Number of Associations.

Table 14: NUMBER OF ASSOCIATIONS AS SCP FOR STORAGE-SCP

| | |
|---|-----------|
| Maximum number of simultaneous associations | Unlimited |
|---|-----------|

5.2.2.3.2. Asynchronous Nature

STORAGE-SCP will only allow a single outstanding operation on an Association. Therefore, STORAGE-SCP will not perform asynchronous operations window negotiation.

5.2.2.3.3. Implementation Identifying Information

Table 15: DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE-SCP

| | |
|-----------------------------|-----------------------------|
| Implementation Class UID | 1.2.276.0.7230010.3.0.3.6.0 |
| Implementation Version Name | OFFIS_DCMTK_360 |

5.2.2.4. Association Initiation Policy

STORAGE-SCP does not initiate associations.

5.2.2.5. Association Acceptance Policy

When STORAGE-SCP accepts an association, it will respond to STORAGE requests. If the Called AE Title does not match the pre-configured AE Title shared by all the SCPs of the application, the association will be rejected.

5.2.2.5.1. Activity – Receive Storage Request

5.2.2.5.1.1. Description and Sequencing of Activities

As instances are received they are copied to the local file system.

If they were duplicated (same UID), overwriting is performed if user agrees.

When copy done (or user agrees the overwrite for existing series or instances), a record inserted into the local database. Otherwise, the new instance being transferred is discarded.

5.2.2.5.1.2. Accepted Presentation Contexts

Table 16: ACCEPTABLE PRESENTATION CONTEXTS FOR STORAGE-SCP

| Presentation Context Table | | | | | |
|---|---|---|--------------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name | Category | | |
| See Storage SCU SOP Classes Table | See Storage SCU SOP Classes Table | See Transfer Syntaxes Table | Basic (when appropriate) | SCU | None |
| | | See Transfer Syntaxes Table | Image (when appropriate) | SCU | None |
| | | See Transfer Syntaxes Table | Video (when appropriate) | SCU | None |

5.2.2.5.1.3. Extended Negotiation

No extended negotiation is performed, through STORAGE-SCP:

- Is a Level 2 Storage SCP (Full – does not discard any data elements).
- Does not support digital signatures.
- Does not coerce any received data elements.

5.2.2.5.1.4. SOP Specific Conformance

5.2.2.5.1.4.1. SOP Specific Conformance to Storage SOP Class

STORAGE-SCP provides standard conformance to the Storage Service Class.

5.2.2.5.1.4.2. Presentation Context Acceptance Criterion

STORAGE-SCP will always accept any Presentation Context for the supported SOP Classes with the supported Transfer Syntaxes (configurable by modality in conformance.xml file). More than one proposed Presentation Context will be accepted for the same Abstract Syntax if the Transfer Syntax is supported, whether or not it is the same as another Presentation Context.

5.2.2.5.1.4.3. Transfer Syntax Selection Policies

STORAGE-SCP prefers explicit Transfer Syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Transfer Syntax:

- a) First encountered and supported explicit Transfer Syntax.

STORAGE-SCP will accept duplicate Presentation Contexts, that is, if it is offered multiple Presentation Contexts, each of which offers acceptable Transfer Syntaxes, it will accept all Presentation Contexts, applying the same priority for selecting a Transfer Syntax for each.

5.2.2.5.1.4.4. Response Status

STORAGE-SCP will behave as described in the Table below when generating the C-STORE response command message.

Table 17: RESPONSE STATUS FOR STORAGE-SCP AND RECEIVE STORAGE REQUEST

| Service Status | Further Meaning | Status Codes | Reason |
|----------------|----------------------------------|--------------|---|
| Refused | Out of resources | A7XX-A7FF | Association aborted or not enough space on disk. |
| Error | Dataset does not match SOP Class | A9XX-A9FF | Association aborted |
| | Cannot understand | CXXX | Association aborted or internal error. |
| Warning | Coercion of Data Elements | B000 | Image transmission is considered successful but some advice has been logged |
| | Dataset does not match SOP Class | B0007 | Image transmission is considered successful but some advice has been logged |
| | Elements discarded | B0006 | Image transmission is considered successful but some advice has been logged |
| Success | | 0000 | |

5.2.3. STORAGE-SCU**5.2.3.1. SOP Classes**

STORAGE-SCU provides Standard Conformance to the following SOP Classes.

Table 18: SOP CLASSES SUPPORTED BY STORAGE-SCU

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|--------------------------------|-----|-----|
| HardcopyGrayscaleImageStorage | 1.2.840.10008.5.1.1.29 | Yes | No |
| HardcopyColorImageStorage | 1.2.840.10008.5.1.1.30 | Yes | No |
| ComputedRadiographyImageStorage | 1.2.840.10008.5.1.4.1.1.1 | Yes | No |
| DigitalXRayImageStorageForPresentation | 1.2.840.10008.5.1.4.1.1.1.1 | Yes | No |
| DigitalXRayImageStorageForProcessing | 1.2.840.10008.5.1.4.1.1.1.1.1 | Yes | No |
| DigitalMammographyXRayImageStorageForPresentation | 1.2.840.10008.5.1.4.1.1.1.2 | Yes | No |
| DigitalMammographyXRayImageStorageForProcessing | 1.2.840.10008.5.1.4.1.1.1.2.1 | Yes | No |
| DigitalIntraOralXRayImageStorageForPresentation | 1.2.840.10008.5.1.4.1.1.1.3 | Yes | No |
| DigitalIntraOralXRayImageStorageForProcessing | 1.2.840.10008.5.1.4.1.1.1.3.1 | Yes | No |
| CTImageStorage | 1.2.840.10008.5.1.4.1.1.2 | Yes | No |
| EnhancedCTImageStorage | 1.2.840.10008.5.1.4.1.1.2.1 | Yes | No |
| UltrasoundMultiframeImageStorage | 1.2.840.10008.5.1.4.1.1.3.1 | Yes | No |
| RetiredUltrasoundMultiframeImageStorage | 1.2.840.10008.5.1.4.1.1.3 | Yes | No |
| MRImageStorage | 1.2.840.10008.5.1.4.1.1.4 | Yes | No |
| EnhancedMRImageStorage | 1.2.840.10008.5.1.4.1.1.4.1 | Yes | No |
| MRSpectroscopyStorage | 1.2.840.10008.5.1.4.1.1.4.2 | Yes | No |
| EnhancedMRColorImageStorage | 1.2.840.10008.5.1.4.1.1.4.3 | Yes | No |
| UltrasoundImageStorage | 1.2.840.10008.5.1.4.1.1.6.1 | Yes | No |
| EnhancedUSVolumeStorage | 1.2.840.10008.5.1.4.1.1.6.2 | Yes | No |
| SecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7 | Yes | No |
| MultiframeSingleBitSecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7.1 | Yes | No |
| MultiframeGrayscaleByteSecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7.2 | Yes | No |
| MultiframeGrayscaleWordSecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7.3 | Yes | No |
| MultiframeTrueColorSecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7.4 | Yes | No |
| XRayRadiofluoroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.12.2 | Yes | No |
| XRayAngiographicImageStorage | 1.2.840.10008.5.1.4.1.1.12.1 | Yes | No |
| EnhancedXAImageStorage | 1.2.840.10008.5.1.4.1.1.12.1.1 | Yes | No |

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|----------------------------------|-----|-----|
| EnhancedXRFImageStorage | 1.2.840.10008.5.1.4.1.1.12.2.1 | Yes | No |
| XRay3DAngiographicImageStorage | 1.2.840.10008.5.1.4.1.1.13.1.1 | Yes | No |
| NuclearMedicineImageStorage | 1.2.840.10008.5.1.4.1.1.20 | Yes | No |
| RawDataStorage | 1.2.840.10008.5.1.4.1.1.66 | Yes | No |
| VLEndoscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.1 | Yes | No |
| VideoEndoscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.1.1 | Yes | No |
| VLMicroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.2 | Yes | No |
| VideoMicroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.2.1 | Yes | No |
| VLSlideCoordinatesMicroscopicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.3 | Yes | No |
| VLPhotographicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.4 | Yes | No |
| VideoPhotographicImageStorage | 1.2.840.10008.5.1.4.1.1.77.1.4.1 | Yes | No |
| PositronEmissionTomographyImageStorage | 1.2.840.10008.5.1.4.1.1.128 | Yes | No |
| RTImageStorage | 1.2.840.10008.5.1.4.1.1.481.1 | Yes | No |
| GrayscaleSoftcopyPresentationStateStorage | 1.2.840.10008.5.1.4.1.1.11.1 | Yes | No |
| BasicTextSRStorage | 1.2.840.10008.5.1.4.1.1.88.11 | Yes | No |
| EnhancedSRStorage | 1.2.840.10008.5.1.4.1.1.88.22 | Yes | No |
| ComprehensiveSRStorage | 1.2.840.10008.5.1.4.1.1.88.33 | Yes | No |
| KeyObjectSelectionDocumentStorage | 1.2.840.10008.5.1.4.1.1.88.59 | Yes | No |
| SecondaryCaptureImageStorage | 1.2.840.10008.5.1.4.1.1.7 | Yes | No |
| ArterialPulseWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.5.1 | Yes | No |
| RespiratoryWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.6.1 | Yes | No |
| HemodynamicWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.2.1 | Yes | No |
| TwelveLeadECGWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.1.1 | Yes | No |
| GeneralECGWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.1.2 | Yes | No |
| AmbulatoryECGWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.1.3 | Yes | No |
| CardiacElectrophysiologyWaveformStorage | 1.2.840.10008.5.1.4.1.1.9.3.1 | Yes | No |

5.2.3.2. Association Policies

5.2.3.3. General

STORAGE-SCU initiates but never accepts associations.

Table 19: MAXIMUM PDU SIZE RECEIVED AS SCP FOR STORAGE-SCU

| | |
|---------------------------|-----------|
| Maximum PDU size received | Unlimited |
|---------------------------|-----------|

5.2.3.3.1. Number of Associations.*Table 20: NUMBER OF ASSOCIATIONS AS SCP FOR STORAGE-SCU*

| | |
|---|---|
| Maximum number of simultaneous associations | 1 |
|---|---|

5.2.3.3.2. Asynchronous Nature

STORAGE-SCU will only allow a single outstanding operation on an Association. Therefore, STORAGE-SCU will not perform asynchronous operations window negotiation.

5.2.3.3.3. Implementation Identifying Information*Table 21: DICOM IMPLEMENTATION CLASS AND VERSION FOR STORAGE-SCU*

| | |
|-----------------------------|-----------------------------|
| Implementation Class UID | 1.2.276.0.7230010.3.0.3.6.0 |
| Implementation Version Name | OFFIS_DCMTK_360 |

5.2.3.4. Association Initiation Policy

STORAGE-SCU attempts to initiate a new association for each instance it attempts to transfer.

5.2.3.5. Association Acceptance Policy

STORAGE-SCU does not accept associations.

5.2.3.5.1. Activity – Send Storage Request**5.2.3.5.1.1. Description and Sequencing of Activities**

For each instance selected from the user interface to be transferred, a single attempt will be made to transmit it to the selected remote AE. If the send fails, for whatever reason, no retry will be performed, and the transaction will be aborted.

5.2.3.5.1.2. Proposed Presentation Contexts*Table 22: PROPOSED PRESENTATION CONTEXTS FOR STORAGE-SCU AND RECEIVE STORAGE REQUEST*

| Presentation Context Table | | | | | |
|---|---|---|--------------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name | Category | | |
| See Storage SCU SOP Classes Table | See Storage SCU SOP Classes Table | See Transfer Syntaxes Table | Basic (when appropriate) | SCU | None |
| | | See Transfer Syntaxes Table | Image (when appropriate) | SCU | None |
| | | See Transfer Syntaxes Table | Video (when appropriate) | SCU | None |

STORAGE-SCU will propose Presentation Contexts only for the SOP Class of the instance that is to be transferred.

For that SOP Class, STORAGE-SCU will propose multiple Presentation Contexts, one for each of the supported Transfer Syntaxes, and an additional Presentation Context with all of the supported Transfer Syntaxes (configurable by modality in conformance.xml file), in order to determine which Transfer Syntaxes the remote SCP supports, and which it prefers.

5.2.3.5.1.3. Extended Negotiation

No extended negotiation is performed.

5.2.3.5.1.4. SOP Specific Conformance

5.2.3.5.1.4.1. SOP Specific Conformance to Storage SOP Class

STORAGE-SCU provides standard conformance to the Storage Service Class.

5.2.3.5.1.4.2. Presentation Context Acceptance Criterion

STORAGE-SCU does not accept associations.

5.2.3.5.1.4.3. Transfer Syntax Selection Policies

STORAGE-SCU prefers explicit Transfer Syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Presentation Context to use for the C-STORE operation:

- a) First encountered explicit Transfer Syntax.

5.2.3.5.1.4.4. Response Status

STORAGE-SCU will behave as described in the Table below in response to the status returned in the C-STORE response command message.

Table 23: RESPONSE STATUS FOR STORAGE-SCU AND RECEIVE STORAGE REQUEST

| Service Status | Further Meaning | Status Codes | Reason |
|-----------------------|----------------------------------|---------------------|---------------|
| Refused | Out of resources | A7XX-A7FF | Logged |
| Error | Dataset does not match SOP Class | A9XX-A9FF | Logged |
| | Cannot understand | CXXX | Logged |
| Warning | Coercion of Data Elements | B000 | Logged |
| | Dataset does not match SOP Class | B0007 | Logged |
| | Elements discarded | B0006 | Logged |
| Success | | 0000 | Logged |

5.2.4. FIND-SCU

5.2.4.1. SOP Classes

FIND-SCU provides Standard Conformance to the following SOP Classes.

Table 24: SOP CLASSES SUPPORTED BY FIND-SCU

| SOP Class Name | SOP Class UID | SCU | SCP |
|--|-----------------------------|-----|-----|
| Patient Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Yes | No |
| Study Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Yes | No |

5.2.4.2. Association Policies

5.2.4.3. General

FIND-SCU initiates but never accepts associations.

Table 25: MAXIMUM PDU SIZE RECEIVED AS SCP FOR FIND-SCU

| | |
|---------------------------|-----------|
| Maximum PDU size received | Unlimited |
|---------------------------|-----------|

5.2.4.3.1. Number of Associations.

Table 26: NUMBER OF ASSOCIATIONS AS A SCP FOR FIND-SCU

| | |
|---|---|
| Maximum number of simultaneous associations | 1 |
|---|---|

5.2.4.3.2. Asynchronous Nature

FIND-SCU will only allow a single outstanding operation on an Association. Therefore, FIND-SCU will not perform asynchronous operations window negotiation.

5.2.4.3.3. Implementation Identifying Information

Table 27: DICOM IMPLEMENTATION CLASS AND VERSION FOR FIND-SCU

| | |
|-----------------------------|-----------------------------|
| Implementation Class UID | 1.2.276.0.7230010.3.0.3.6.0 |
| Implementation Version Name | OFFIS_DCMTK_360 |

5.2.4.4. Association Initiation Policy

FIND-SCU attempts to initiate a new association when the user performs the query action from the user interface. If this involves recursive queries for lower query levels in the hierarchy, these will be performed on the same association or any other one depending on the AE configuration in Ginkgo CADx Framework.

5.2.4.5. Association Acceptance Policy

FIND-SCU does not accept associations.

5.2.4.5.1. Activity – Send Query Request

5.2.4.5.1.1. Description and Sequencing of Activities

A single attempt will be made to query the remote AE. If the query fails, for whatever reason, no retry will be performed.

5.2.4.5.1.2. Proposed Presentation Contexts

Table 28: PROPOSED PRESENTATION CONTEXTS FOR FIND-SCU AND QUERY REMOTE AE

| Presentation Context Table | | | | | |
|--|--|---------------------------|---------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name | UID | | |
| See Find SCU SOP Classes Table | See Find SCU SOP Classes Table | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCU | None |

FIND-SCU will propose multiple Presentation Contexts, one for each of the supported Transfer Syntaxes, in order to determine which Transfer Syntaxes the remote SCP supports, and which it prefers.

5.2.4.5.1.3. Extended Negotiation

No extended negotiation is performed.

In particular, relational queries are not supported.

5.2.4.5.1.4. SOP Specific Conformance

5.2.4.5.1.4.1. SOP Specific Conformance to C-FIND SOP Class

FIND-SCU provides standard conformance to the service class.

Both Study and Patient Root Information Models are supported.

All queries are initiated at the highest level of the information model (the STUDY level), and then for each response received, recursively repeated at the next lower levels (the SERIES and then IMAGE levels, if needed), in order to completely elucidate the “tree” of instances available on the remote AE (from which the user may subsequently request a retrieval at any level).

CANCEL requests are performed when in some conditions (i.e.: User restrictions in application

profiles).

Unexpected attributes returned in a C-FIND response (those not requested) are listed in the browser at the appropriate level if present in the dictionary. Requested return attributes not returned by the SCP are ignored. Non-matching responses returned by the SCP due to unsupported (hopefully optional) matching keys are not filtered locally by the FIND-SCU and thus will still be presented in the browser. No attempt is made to filter out duplicate responses.

Specific Character Set will always be included at every query level. If present in the response, Specific Character Set will be used to identify character sets other than the default character set for display of strings in the browser.

5.2.4.5.1.4.2. Presentation Context Acceptance Criterion

FIND-SCU does not accept associations.

5.2.4.5.1.4.3. Request identifiers

Table 29: STUDY ROOT REQUEST IDENTIFIERS FOR FIND-SCU

| Name | Tag | Types of Matching [2] |
|----------------------------|-------------|-----------------------|
| STUDY Level | | |
| Patient's ID | (0010,0020) | S,*,U |
| Patient's Name | (0010,0010) | S,*,U |
| Patient's Birth Date | (0010,0030) | S,*,U,R |
| Patient's Sex | (0010,0040) | S,*,U |
| Study ID | (0020,0010) | S,*,U |
| Study Description | (0008,1030) | S,*,U |
| Modalities in Study | (0008,0061) | S,*,U |
| Study Date | (0008,0020) | S,*,U,R |
| Study Time | (0008,0030) | S,*,U,R |
| Referring Physician's Name | (0008,0090) | S,*,U |
| Accession Number | (0008,0050) | S,*,U |
| Patient's Age | (0010,1010) | S,*,U |
| Patient's Size | (0010,1020) | S,*,U |
| Patient's Weight | (0010,1030) | S,*,U |
| Study Instance UID | (0020,000D) | UNIQUE |
| SERIES Level | | |
| Series Description | (0020,0011) | S,*,U |
| Modality | (0008,0060) | S,*,U |
| Series Date | (0008,0021) | S,*,U |

| Name | Tag | Types of Matching [2] |
|-----------------------------------|-------------|-----------------------|
| Series Time | (0008,0031) | S,*,U |
| Series Instance UID | (0020,000E) | UNIQUE |
| IMAGE Level | | |
| Image Comments | (0020,4000) | S,*,U |
| SOP Instance UID | (0008,0018) | UNIQUE |
| SOP Class UID | (0008,0016) | NONE |
| Common to all Query Levels | | |
| Specific Character Set | (0008,0005) | S,*,U |

[2] Types of Matching

The types of Matching supported by the C-FIND SCU. An "S" indicates the identifier attribute uses Single Value Matching, an "R" indicates Range Matching, a "*" indicates wildcard matching, a "U" indicates Universal Matching, and an "L" indicates that UID lists are sent. "NONE" indicates that no matching is supported, but that values for this Element are requested to be returned (i.e. universal matching), and "UNIQUE" indicates that this is the Unique Key for that query level, in which case Universal Matching or Single Value Matching is used depending on the query level.

5.2.4.5.1.4.4. Transfer Syntax Selection Policies

FIND-SCU prefers explicit Transfer Syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Presentation Context to use for the C-FIND operation:

- First encountered explicit Transfer Syntax.

5.2.4.5.1.4.5. Response Status

FIND-SCU will behave as described in the Table below in response to the status returned in the C-FIND response command message(s).

Table 30: RESPONSE STATUS FOR FIND-SCU AND QUERY REMOTE AE REQUEST

| Service Status | Further Meaning | Status Codes | Reason |
|----------------|-------------------------------------|--------------|---|
| Refused | Out of resources | A7XX-A7FF | Current query is terminated; remaining queries continue |
| Error | Identifier does not match SOP Class | A9XX-A9FF | Current query is terminated; remaining queries continue |
| | Unable to process | CXXX | Current query is terminated; remaining queries continue |
| Cancel | Matching terminated due to | FE00 | Current query is |

| Service Status | Further Meaning | Status Codes | Reason |
|----------------|--|--------------|---|
| | Cancel request | | terminated; remaining queries terminates. |
| Success | | 0000 | Current query is terminated; remaining queries continue |
| Pending | Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys | FF00 | Identifier used to populate browser and trigger recursive lower level queries |
| | Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier | FF01 | Identifier used to populate browser and trigger recursive lower level queries |

5.2.5. MOVE-SCU

5.2.5.1. SOP Classes

MOVE-SCU provides Standard Conformance to the following SOP Classes.

Table 31: SOP CLASSES SUPPORTED BY MOVE-SCU

| SOP Class Name | SOP Class UID | SCU | SCP |
|--|-----------------------------|-----|-----|
| Patient Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Yes | No |
| Study Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Yes | No |

5.2.5.2. Association Policies

5.2.5.3. General

MOVE-SCU initiates but never accepts associations.

Table 32: MAXIMUM PDU SIZE RECEIVED AS SCP FOR MOVE-SCU

| | |
|---------------------------|-----------|
| Maximum PDU size received | Unlimited |
|---------------------------|-----------|

5.2.5.3.1. Number of Associations.

Table 33: NUMBER OF ASSOCIATIONS AS A SCP FOR MOVE-SCU

| | |
|---|---|
| Maximum number of simultaneous associations | 1 |
|---|---|

5.2.5.3.2. Asynchronous Nature

MOVE-SCU will only allow a single outstanding operation on an Association. Therefore, MOVE-SCU will not perform asynchronous operations window negotiation.

5.2.5.3.3. Implementation Identifying Information

Table 34: DICOM IMPLEMENTATION CLASS AND VERSION FOR MOVE-SCU

| | |
|-----------------------------|-----------------------------|
| Implementation Class UID | 1.2.276.0.7230010.3.0.3.6.0 |
| Implementation Version Name | OFFIS_DCMTK_360 |

5.2.5.4. Association Initiation Policy

MOVE-SCU attempts to initiate a new association when the user performs the query action from the user interface.

5.2.5.5. Association Acceptance Policy

MOVE-SCU does not accept associations.

5.2.5.5.1. Activity – Send Storage Request

5.2.5.5.1.1. Description and Sequencing of Activities

A single attempt will be made to query the remote AE. If the query fails, for whatever reason, no retry will be performed.

5.2.5.5.1.2. Proposed Presentation Contexts

Table 35: PROPOSED PRESENTATION CONTEXTS FOR MOVE-SCU AND QUERY REMOTE AE

| Presentation Context Table | | | | | |
|--|--|---------------------------|---------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name | UID | | |
| See Move SCU SOP Classes Table | See Move SCU SOP Classes Table | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCU | None |

MOVE-SCU will propose multiple Presentation Contexts, one for each of the supported Transfer Syntaxes, in order to determine which Transfer Syntaxes the remote SCP supports, and which it prefers.

5.2.5.5.1.3. Extended Negotiation

No extended negotiation is performed.

5.2.5.5.1.4. SOP Specific Conformance

5.2.5.5.1.4.1. SOP Specific Conformance to C-MOVE SOP Class

MOVE-SCU provides standard conformance to the Storage Service Class.

Both Study and Patient Root Information Models are supported.

A retrieval will be performed at the STUDY or SERIES level depending on Remote AE configuration in Ginkgo CADx Framework.

CANCEL requests are performed when in some conditions (i.e.: User restrictions in application profiles).

The retrieval is performed from the AE that was specified in the Retrieve AE attribute returned from the query performed by FIND-SCU as well as by XML integration files. The instances are retrieved to the current application's local database by specifying the destination as the AE Title of the STORE-SCP AE of the local application. This implies that the remote C-MOVE SCP must be preconfigured to determine the presentation address corresponding to the STORE-SCP AE. The STORE-SCP AE will accept storage requests addressed to it from anywhere, so no pre-configuration of the local application to accept from the remote AE is necessary (except in so far as it was necessary to configure FIND-SCU).

Table 36: STUDY ROOT REQUEST IDENTIFIER FOR MOVE-SCU

| Name | Tag | Types of Matching[3] |
|---------------------|-------------|----------------------|
| STUDY Level | | |
| Study Instance UID | (0020,000D) | UNIQUE |
| SERIES Level | | |
| Series Instance UID | (0020,000E) | UNIQUE |
| IMAGE Level | | |
| SOP Instance UID | (0008,0018) | UNIQUE |

[3] Types of Matching

The types of Matching supported by the C-MOVE SCU.

5.2.5.5.1.4.2. Transfer Syntax Selection Policies

MOVE-SCU prefers explicit Transfer Syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Presentation Context to use for the C-STORE operation:

- a) First encountered explicit Transfer Syntax.

5.2.5.5.1.4.3. Response Status

MOVE-SCU will behave as described in the Table below in response to the status returned in the C-MOVE response command message(s).

Table 37: RESPONSE STATUS FOR MOVE-SCU AND RETRIEVE FROM REMOTE AE REQUEST

| Service Status | Further Meaning | Status Codes | Related Fields | Reason |
|-----------------------|--|---------------------|--|-------------------------|
| Refused | Out of Resources - Unable to calculate number of matches | A701 | (0000,0902) | Retrieval is terminated |
| | Out of Resources - Unable to perform sub-operations | A702 | (0000,1020) (0000,1021) (0000,1022) (0000,1023) | Retrieval is terminated |
| | Move Destination unknown | A801 | (0000,0902) | Retrieval is terminated |
| Failed | Identifier does not match SOP Class | A900 | (0000,0901) (0000,0902) | Retrieval is terminated |
| | Unable to process | CXXX | (0000,0901) (0000,0902) | Retrieval is terminated |
| Cancel | Sub-operations terminated due to Cancel Indication | FE00 | (0000,1020) (0000,1021) (0000,1022) (0000,1023) | Retrieval is terminated |
| Warning | Sub-operations Complete - One or more Failures | B000 | (0000,1020) (0000,1022) (0000,1023) | Retrieval is terminated |
| Success | Sub-operations Complete – No Failures | 0000 | (0000,1020) (0000,1021) (0000,1022) (0000,1023) | Retrieval is terminated |
| Pending | Sub-operations are continuing | FF00 | (0000,1020) (0000,1021) (0000,1022) (0000,1023) | Retrieval continues. |

5.2.5.5.1.4.4. Sub-operation dependent behavior

Since the C-MOVE operation is dependent on completion of C-STORE sub-operations that are occurring on a separate association, the question of failure of operations on the other association(s) must be considered.

MOVE-SCU completely ignores whatever activities are taking place in relation to the STORAGE-SCP AE that is receiving the retrieved instances. Once the C-MOVE has been initiated it runs to completion (or failure) as described in the C-MOVE response command message(s). There is no

attempt by MOVE-SCU to confirm that instances have actually been successfully received or locally stored.

Whether or not completely or partially successfully retrievals are made available in the local database to the user is purely dependent on the success or failure of the C-STORE sub-operations, not on any explicit action by MOVE-SCU.

Whether or not the remote AE attempts to retry any failed C-STORE sub-operations is beyond the control of MOVE-SCU.

If the association on which the C-MOVE was issued is aborted for any reason, whether or not the C-STORE sub-operations continue is dependent on the remote AE; the local STORAGE-SCP won't continue to accept associations and storage operations until another association were performed.

5.2.6. GET-SCU

5.2.6.1. SOP Classes

GET-SCU provides Standard Conformance to the following SOP Classes.

Table 38: SOP CLASSES SUPPORTED BY GET-SCU

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|-----------------------------|-----|-----|
| Patient Root Query/Retrieve Information Model - GET | 1.2.840.10008.5.1.4.1.2.1.3 | Yes | No |
| Study Root Query/Retrieve Information Model - GET | 1.2.840.10008.5.1.4.1.2.2.3 | Yes | No |

5.2.6.2. Association Policies

5.2.6.3. General

GET-SCU initiates but never accepts associations.

Table 39: MAXIMUM PDU SIZE RECEIVED AS SCP FOR GET-SCU

| | |
|---------------------------|-----------|
| Maximum PDU size received | Unlimited |
|---------------------------|-----------|

5.2.6.3.1. Number of Associations.

Table 40: NUMBER OF ASSOCIATIONS AS A SCP FOR GET-SCU

| | |
|---|---|
| Maximum number of simultaneous associations | 1 |
|---|---|

5.2.6.3.2. Asynchronous Nature

GET-SCU will only allow a single outstanding operation on an Association. Therefore, GET-SCU will not perform asynchronous operations window negotiation.

5.2.6.3.3. Implementation Identifying Information

Table 41: DICOM IMPLEMENTATION CLASS AND VERSION FOR GET-SCU

| | |
|-----------------------------|-----------------------------|
| Implementation Class UID | 1.2.276.0.7230010.3.0.3.6.0 |
| Implementation Version Name | OFFIS_DCMTK_360 |

5.2.6.4. Association Initiation Policy

GET-SCU attempts to initiate a new association when the user performs the query action from the user interface.

5.2.6.5. Association Acceptance Policy

GET-SCU does not accept associations.

5.2.6.5.1. Activity – Send Storage Request

5.2.6.5.1.1. Description and Sequencing of Activities

A single attempt will be made to query the remote AE. If the query fails, for whatever reason, no retry will be performed.

5.2.6.5.1.2. Proposed Presentation Contexts

Table 42: PROPOSED PRESENTATION CONTEXTS FOR GET-SCU AND QUERY REMOTE AE

| Presentation Context Table | | | | | |
|---|---|---------------------------|---------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name | UID | | |
| See Get SCU SOP Classes Table | See Get SCU SOP Classes Table | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCU | None |

GET-SCU will propose multiple Presentation Contexts, one for each of the supported Transfer Syntaxes, in order to determine which Transfer Syntaxes the remote SCP supports, and which it prefers.

5.2.6.5.1.3. Extended Negotiation

No extended negotiation is performed.

5.2.6.5.1.4. SOP Specific Conformance

5.2.6.5.1.4.1. SOP Specific Conformance to C-GET SOP Class

GET-SCU provides standard conformance to the Storage Service Class.

Both Study and Patient Root Information Models are supported.

A retrieval will be performed at the STUDY or SERIES level depending on Remote AE configuration in Ginkgo CADx Framework.

CANCEL requests are performed when in some conditions (i.e.: User restrictions in application profiles).

The retrieval is performed from the AE that was specified in the Retrieve AE attribute returned from the query performed by FIND-SCU as well as by XML integration files. The instances are retrieved to the current application's local database by specifying the destination as the AE Title of the STORE-SCP AE of the local application in the same association.

Table 43: STUDY ROOT REQUEST IDENTIFIER FOR GET-SCU

| Name | Tag | Types of Matching[4] |
|---------------------|-------------|----------------------|
| STUDY Level | | |
| Study Instance UID | (0020,000D) | UNIQUE |
| SERIES Level | | |
| Series Instance UID | (0020,000E) | UNIQUE |
| IMAGE Level | | |
| SOP Instance UID | (0008,0018) | UNIQUE |

[4] Types of Matching

The types of Matching supported by the C-GET SCU.

5.2.6.5.1.4.2. Transfer Syntax Selection Policies

GET-SCU prefers explicit Transfer Syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Presentation Context to use for the C-STORE operation:

- b) First encountered explicit Transfer Syntax.

5.2.6.5.1.4.3. Response Status

GET-SCU will behave as described in the Table below in response to the status returned in the C-GET response command message(s).

Table 44: RESPONSE STATUS FOR GET-SCU AND RETRIEVE FROM REMOTE AE REQUEST

| Service Status | Further Meaning | Status Codes | Related Fields | Reason |
|----------------|--|--------------|--|-------------------------|
| Refused | Out of Resources - Unable to calculate number of matches | A701 | (0000,0902) | Retrieval is terminated |
| | Out of Resources - Unable to perform sub-operations | A702 | (0000,1020) (0000,1021) (0000,1022) (0000,1023) | Retrieval is terminated |
| Failed | Identifier does not match SOP Class | A900 | (0000,0901) (0000,0902) | Retrieval is terminated |
| | Unable to process | CXXX | (0000,0901) (0000,0902) | Retrieval is terminated |
| Cancel | Sub-operations terminated due to Cancel Indication | FE00 | (0000,1020) (0000,1021) (0000,1022) (0000,1023) | Retrieval is terminated |
| Warning | Sub-operations Complete - One or more Failures | B000 | (0000,1020) (0000,1022) (0000,1023) | Retrieval is terminated |
| Success | Sub-operations Complete – No Failures | 0000 | (0000,1020) (0000,1021) (0000,1022) (0000,1023) | Retrieval is terminated |
| Pending | Sub-operations are continuing | FF00 | (0000,1020) (0000,1021) (0000,1022) (0000,1023) | Retrieval continues. |

5.2.7. WORKLIST-SCU

WORKLIST-SCU is available with Ginkgo CADx Pro distribution [GP] .

5.2.7.1. SOP Classes

WORKLIST-SCU provides Standard Conformance to the following SOP Classes.

Table 45: SOP CLASSES SUPPORTED BY WORKLIST

| SOP Class Name | SOP Class UID | SCU | SCP |
|--|------------------------|---------|-----|
| Modality Worklist Information Model - FIND | 1.2.840.10008.5.1.4.31 | Yes[GP] | No |

5.2.7.2. Association Policies

5.2.7.3. General

WORKLIST initiates but never accepts associations.

Table 46: MAXIMUM PDU SIZE RECEIVED AS SCP FOR WORKLIST

| | |
|---------------------------|-----------|
| Maximum PDU size received | Unlimited |
|---------------------------|-----------|

5.2.7.3.1. Number of Associations.

Table 47: NUMBER OF ASSOCIATIONS AS A SCP FOR WORKLIST

| | |
|---|---|
| Maximum number of simultaneous associations | 1 |
|---|---|

5.2.7.3.2. Asynchronous Nature

WORKLIST will only allow a single outstanding operation on an Association. Therefore, WORKLIST will not perform asynchronous operations window negotiation.

5.2.7.3.3. Implementation Identifying Information

Table 48: DICOM IMPLEMENTATION CLASS AND VERSION FOR WORKLIST

| | |
|-----------------------------|-----------------------------|
| Implementation Class UID | 1.2.276.0.7230010.3.0.3.6.0 |
| Implementation Version Name | OFFIS_DCMTK_360 |

5.2.7.4. Association Initiation Policy

WORKLIST attempts to initiate a new association when the user performs the query action from the user interface which will be performed on the same association depending on the AE configuration in Ginkgo CADx Framework.

5.2.7.5. Association Acceptance Policy

WORKLIST does not accept associations.

5.2.7.5.1. Activity – Query Worklist items

5.2.7.5.1.1. Description and Sequencing of Activities

A single attempt will be made to query the remote AE.

5.2.7.5.1.2. Proposed Presentation Contexts*Table 49: PROPOSED PRESENTATION CONTEXTS FOR WORKLIST AND QUERY REMOTE AE*

| Presentation Context Table | | | | | |
|--|--|---------------------------|---------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name | UID | | |
| See WORKLIST-SCU SOP Classes Table | See WORKLIST-SCU SOP Classes Table | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCU | None |

WORKLIST-SCU will propose multiple Presentation Contexts, one for each of the supported Transfer Syntaxes, in order to determine which Transfer Syntaxes the remote SCP supports, and which it prefers.

5.2.7.5.1.3. Extended Negotiation

No extended negotiation is performed.

5.2.7.5.1.4. SOP Specific Conformance**5.2.7.5.1.4.1. SOP Specific Conformance to WORKLIST SOP Class**

WORKLIST-SCU provides standard conformance to the service class.

Unexpected attributes returned in a C-FIND response (those not requested) are listed in the browser if present in the dictionary. Requested return attributes not returned by the SCP are ignored. Non-matching responses returned by the SCP due to unsupported (hopefully optional) matching keys are not filtered locally and thus will still be presented in the browser. No attempt is made to filter out duplicate responses.

Specific Character Set will always be included at every query level. If present in the response, Specific Character Set will be used to identify character sets other than the default character set for display of strings in the browser.

5.2.7.5.1.4.2. Presentation Context Acceptance Criterion

WORKLIST-SCU does not accept associations.

5.2.7.5.1.4.3. Request identifiers*Table 50: MODALITY WORKLIST ROOT REQUEST IDENTIFIERS FOR WORKLIST-SCU*

| Name | Tag | Types of Matching [2] |
|------------------------|-------------|-----------------------|
| Specific Character Set | (0008,0005) | NONE |

| Name | Tag | Types of Matching [2] |
|---------------------------------------|-------------|------------------------------|
| Accession Number | (0008,0050) | NONE |
| Referring Physician's Name | (0008,0090) | NONE |
| Patient's Name | (0010,0010) | NONE |
| Patient's ID | (0010,0020) | NONE |
| Issuer of Patient ID | (0010,0021) | NONE |
| Patient's Birth Date | (0010,0030) | NONE |
| Patient's Sex | (0010,0040) | NONE |
| Pregnancy Status | (0010,21C0) | NONE |
| Study Instance UID | (0020,000D) | UNIQUE |
| Requesting Physician | (0032,1032) | NONE |
| Admission ID | (0038,0010) | NONE |
| Issuer of Admission ID | (0038,0011) | NONE |
| Requested Procedure ID | (0040,1001) | UNIQUE |
| Requested Procedure Priority | (0040,1003) | NONE |
| Requested Procedure Comments | (0040,1400) | NONE |
| Placer Order Number | (0040,2016) | NONE |
| Filler Order Number | (0040,2017) | NONE |
| Scheduled Procedure Step Sequence | (0040,0100) | L,U |
| >Modality | (0008,0060) | L,*,U |
| >Scheduled Station AE Title | (0040,0001) | S,*,U,R |
| >Scheduled Procedure Step Start Date | (0040,0002) | S,*,U,R |
| >Scheduled Procedure Step Start Time | (0040,0003) | NONE |
| >Scheduled Procedure Step Description | (0040,0007) | NONE |
| >Scheduled Procedure Step ID | (0040,0009) | UNIQUE |
| >Scheduled Station Name | (0040,0010) | NONE |
| >Scheduled Procedure Step Location | (0040,0011) | NONE |
| >Scheduled Procedure Step Status | (0040,0020) | L,*,U |
| >Scheduled Protocol Code Sequence | (0040,0008) | L,U |
| >>Code Value | (0008,0100) | NONE |
| >>Coding Scheme Designator | (0008,0102) | NONE |
| >>Code Meaning | (0008,0104) | NONE |

[2] Types of Matching

The types of Matching supported by WORKLIST-SCU. An "S" indicates the identifier attribute uses

Single Value Matching, an “R” indicates Range Matching, a n“*” indicates wildcard matching, a ‘U’ indicates Universal Matching, and an ‘L’ indicates that UID lists are sent. “NONE” indicates that no matching is supported, but that values for this Element are requested to be returned (i.e. universal matching), and “UNIQUE” indicates that this is the Unique Key for that query level, in which case Universal Matching or Single Value Matching is used depending on the query level.

5.2.7.5.1.4.4. Transfer Syntax Selection Policies

WORKLIST-SCU prefers explicit Transfer Syntaxes. If offered a choice of Transfer Syntaxes in a Presentation Context, it will apply the following priority to the choice of Presentation Context to use for the C-FIND operation:

- b) First encountered explicit Transfer Syntax.

5.2.7.5.1.4.5. Response Status

WORKLIST-SCU will behave as described in the Table below in response to the status returned in the C-FIND response command message(s).

Table 51: RESPONSE STATUS FOR WORKLIST-SCU AND QUERY REMOTE AE REQUEST

| Service Status | Further Meaning | Status Codes | Reason |
|----------------|--|--------------|---|
| Refused | Out of resources | A7XX-A7FF | Current query is terminated; remaining queries continue |
| Error | Identifier does not match SOP Class | A9XX-A9FF | Current query is terminated; remaining queries continue |
| | Unable to process | CXXX | Current query is terminated; remaining queries continue |
| Cancel | Matching terminated due to Cancel request | FE00 | Current query is terminated; remaining queries terminates. |
| Success | | 0000 | Current query is terminated; remaining queries continue |
| Pending | Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys | FF00 | Identifier used to populate browser and trigger recursive lower level queries |
| | Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier | FF01 | Identifier used to populate browser and trigger recursive lower level queries |

5.2.8. HARDCOPY-SCU

5.2.8.1. SOP Classes

HARDCOPY-SCU provides Standard Conformance to the following SOP Classes.

Table 52: SOP CLASSES SUPPORTED BY HARDCOPY-SCU

| SOP Class Name | SOP Class UID | SCU | SCP |
|---|-----------------------|-----|-----|
| Basic Grayscale Print Management Meta SOP Class | 1.2.840.10008.5.1.1.9 | Yes | No |

5.2.8.2. Association Policies

5.2.8.3. General

HARDCOPY-SCU initiates but never accepts associations.

Table 53: MAXIMUM PDU SIZE RECEIVED AS SCP FOR HARDCOPY-SCU

| | |
|---------------------------|-----------|
| Maximum PDU size received | Unlimited |
|---------------------------|-----------|

5.2.8.3.1. Number of Associations.

Table 54: NUMBER OF ASSOCIATIONS AS A SCP FOR HARDCOPY-SCU

| | |
|---|---|
| Maximum number of simultaneous associations | 1 |
|---|---|

5.2.8.3.2. Asynchronous Nature

HARDCOPY-SCU will only allow a single outstanding operation on an Association. Therefore, HARDCOPY-SCU will not perform asynchronous operations window negotiation.

5.2.8.3.3. Implementation Identifying Information

Table 55: DICOM IMPLEMENTATION CLASS AND VERSION FOR HARDCOPY-SCU

| | |
|-----------------------------|-----------------------------|
| Implementation Class UID | 1.2.276.0.7230010.3.0.3.6.0 |
| Implementation Version Name | OFFIS_DCMTK_360 |

5.2.8.4. Association Initiation Policy

HARDCOPY-SCU attempts to initiate a new association when the user performs the query action from the user interface.

5.2.8.5. Association Acceptance Policy

HARDCOPY-SCU does not accept associations.

5.2.8.5.1. Activity – Film images

5.2.8.5.1.1. Description and Sequencing of Activities

A user selects series and requests them to be sent to a specific hardcopy device. The user can select the desired film format and number of copies. Each print-job is forwarded to the job queue and processed individually.

The HARDCOPY-SCU is invoked by the user interface that is responsible for processing network tasks.

The job consists of data describing the images and graphics to be printed as well as the requested layout and other parameters. The film sheet is internally processed and the page images is sent. If no association to the printer can be established, the print-job is switched to a failed state and the user informed.

A typical sequence of DIMSE messages sent over an association between Hardcopy AE and a Printer is:

1. HARDCOPY-SCU opens an association with the Printer
2. N-GET on the Printer SOP Class is used to obtain current printer status information. If the Printer reports a status of FAILURE, the print-job is switched to a failed state and the user informed.
3. N-CREATE on the Film Session SOP Class creates a Film Session.
4. N-CREATE on the Film Box SOP Class creates a Film Box linked to the Film Session. A single Image Box will be created as the result of this operation.
5. N-SET on the Image Box SOP Class transfers the contents of the film sheet to the printer.
6. N-ACTION on the Film Box SOP Class instructs the printer to print the Film Box
7. The printer prints the requested number of film sheets
8. The Printer synchronously reports its status via N-EVENT-REPORT notification (Printer SOP Class). HARDCOPY-SCU requires the NEVENT-REPORT to be sent during an association. If the Printer reports a status of FAILURE, the print-job is switched to a failed state and the user informed.
9. N-DELETE on the Film Session SOP Class deletes the complete Film Session SOP Instance hierarchy.
10. HARDCOPY-SCU closes the association with the Printer Status of the print-job is reported through the job control interface. Only one job will be active at a time for each separate hardcopy device. If any Response from the remote Application contains a status other than Success or Warning, the Association is aborted and the related Job is switched to a failed state. It can be restarted any time by user interaction or, if configured, by automated retry.

5.2.8.5.1.2. Proposed Presentation Contexts*Table 56: PROPOSED PRESENTATION CONTEXTS FOR HARDCOPY-SCU*

| Presentation Context Table | | | | | |
|--|--|---------------------------|---------------------|------|----------------------|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name | UID | | |
| See HARDCOPY SCU SOP Classes Table | See HARDCOPY SCU SOP Classes Table | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit VR Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCU | None |

HARDCOPY-SCU will propose multiple Presentation Contexts, one for each of the supported Transfer Syntaxes, in order to determine which Transfer Syntaxes the remote SCP supports, and which it prefers.

5.2.8.5.1.3. Extended Negotiation

No extended negotiation is performed.

5.2.8.5.1.4. SOP Specific Conformance**5.2.8.5.1.4.1. SOP Specific Conformance for the Printer SOP Class**

HARDCOPY-SCU supports the following DIMSE operations and notifications for the Printer SOP Class:

- N-GET
- N-EVENT-REPORT

Details of the supported attributes and status handling behaviour are described in the following subsections.

5.2.8.5.1.4.1.1 Printer SOP Class Operations (N-GET)

Hardcopy AE uses the Printer SOP Class N-GET operation to obtain information about the current printer status. The attributes obtained via N-GET are listed in the table below:

Table 57: PRINTER SOP CLASS N-GET REQUEST ATTRIBUTES

| Name | Tag | Value | Presence | Source |
|---------------------|-------------|---------------------|----------|---------|
| Printer Status | (2110,0010) | Provided by printer | ALWAYS | Printer |
| Printer Status Info | (2110,0020) | Provided by printer | ALWAYS | Printer |

Table 58: PRINTER SOP CLASS N-GET RESPONSE STATUS HANDLING BEHAVIOR

| Service Status | Further Meaning | Status Codes | Behavior | Related Fields |
|----------------|-----------------|--------------|--|----------------|
| Success | Success | 0000H | The request to get printer status information was success. | - |
| * | Failure | Any other | The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user. | - |

5.2.8.5.1.4.1.2 Printer SOP Class Notifications (N-EVENT-REPORT)

HARDCOPY-SCU is capable of receiving an N-EVENT-REPORT request at any time during an association. The behavior of Hardcopy AE when receiving Event Types within the N-EVENT-REPORT is summarized in the Table below:

Table 59: PRINTER SOP CLASS N-EVENT-REPORT BEHAVIOR

| Service Status | Event Type ID | Behavior |
|----------------|---------------|--|
| Normal | 1 | The print-job continues to be printed. |
| Warning | 2 | The print-job continues to be printed. The contents of Printer Status Info (2110,0020) is logged and reported to the user via the job-control application. |
| Failure | 3 | The print-job is marked as failed. The contents of Printer Status Info (2110,0020) is logged and reported to the user via the job-control application. |
| * | * | An invalid Event Type ID will cause a status code of 0113H to be returned in a N-EVENT-REPORT response. |

The reasons for returning specific status codes in a N-EVENT-REPORT response are summarized in the Table below:

Table 60: PRINTER SOP CLASS N-EVENT-REPORT RESPONSE STATUS REASONS

| Service Status | Further Meaning | Error Code | Reasons |
|----------------|--------------------|------------|--|
| Success | Success | 0000H | The notification event has been successfully received. |
| Failure | Processing failure | Any other | An internal error occurred during processing of the N-EVENTREPORT. |

5.2.8.5.1.4.2. SOP Specific Conformance for the Film Session SOP Class

HARDCOPY-SCU supports the following DIMSE operations for the Film Session SOP Class:

- N-CREATE

□ N-DELETE

Details of the supported attributes and status handling behavior are described in the following subsections.

5.2.8.5.1.4.2.1 Film Session SOP Class Operations (N-CREATE)

The attributes supplied in an N-CREATE Request are listed in the Table below:

Table 61: FILM SESSION SOP CLASS N-CREATE REQUEST ATTRIBUTES

| Name | Tag | Value | Presence | Source |
|------------------|-------------|--------------------------------|----------|--------|
| Number of Copies | (2000,0010) | 1..* | ALWAYS | User |
| Medium Type | (2000,0030) | BLUE FILM, CLEAR FILM or PAPER | ALWAYS | User |
| Film Destination | (2000,0040) | MAGAZINE or PROCESSOR | ALWAYS | User |

The behavior of HARDCOPY-SCU when encountering status codes in a N-CREATE response is summarized in the Table below:

Table 62: FILM SESSION SOP CLASS N-CREATE RESPONSE STATUS HANDLING BEHAVIOR

| Service Status | Further Meaning | Status Codes | Behavior | Related Fields |
|----------------|-----------------|--------------|--|----------------|
| Success | Success | 0000 | The SCP has completed the operation successfully. | - |
| * | Failure | Any other | The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user. | - |

5.2.8.5.1.4.2.2 Film Session SOP Class Operations (N-DELETE)

The behavior of HARDCOPY-SCU when encountering status codes in a N-DELETE response is summarized in the Table below:

Table 63: FILM SESSION SOP CLASS N-DELETE RESPONSE STATUS HANDLING BEHAVIOR

| Service Status | Further Meaning | Status Codes | Behavior | Related Fields |
|----------------|-----------------|--------------|--|----------------|
| Success | Success | 0000 | The SCP has completed the operation successfully. | - |
| * | Failure | Any other | The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user. | - |

5.2.8.5.1.4.3. SOP Specific Conformance for the Film Box SOP Class

HARDCOPY-SCU supports the following DIMSE operations for the Film Box SOP Class:

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

Details of the supported attributes and status handling behavior are described in the following subsections.

5.2.8.5.1.4.3.1 Film Box SOP Class Operations (N-CREATE)

The attributes supplied in an N-CREATE Request are listed in the Table below:

Table 64: FILM BOX SOP CLASS N-CREATE REQUEST ATTRIBUTES

| Name | Tag | Value | Presence | Source |
|----------------------------------|-------------|--|----------|--------|
| Image Display Format | (2010,0010) | STANDARD\1,1 STANDARD\1,2 STANDARD\2,1 STANDARD\2,2 STANDARD\2,3 STANDARD\2,4 STANDARD\3,3 STANDARD\3,4 STANDARD\3,5 STANDARD\4,4 STANDARD\4,5 STANDARD\4,6 STANDARD\5,6 STANDARD\5,7 | ALWAYS | User |
| Referenced Film Session Sequence | (2010,0500) | | ALWAYS | Auto |
| >Referenced SOP Class UID | (0008,1150) | 1.2.840.10008.5.1.1.1 | ALWAYS | Auto |
| >Referenced SOP Instance UID | (0008,1155) | From create Film Session SOP Instance | ALWAYS | Auto |
| Film Orientation | (2010,0040) | PORTRAIT or LANDSCAPE | ALWAYS | User |
| Film Size ID | (2010,0050) | 8INX10IN 8_5INX10IN 10INX12IN 10INX14IN 11INX14IN 11INX17IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM A4 | ALWAYS | User |

| Name | Tag | Value | Presence | Source |
|--------------------|-------------|------------------------------------|----------|--------|
| | | A3 | | |
| Magnification Type | (2010,0060) | REPLICATE, BILINEAR, CUBIC or NONE | ALWAYS | User |
| Border Density | (2010,0100) | BLACK or WHITE | ALWAYS | User |

The behavior of HARDCOPY-SCU when encountering status codes in a N-CREATE response is summarized in the Table below:

Table 65: FILM BOX SOP CLASS N-CREATE RESPONSE STATUS HANDLING BEHAVIOR

| Service Status | Further Meaning | Status Codes | Behavior | Related Fields |
|----------------|-----------------|--------------|--|----------------|
| Success | Success | 0000 | The SCP has completed the operation successfully. | - |
| * | Failure | Any other | The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user. | - |

5.2.8.5.1.4.3.2 Film Box SOP Class Operations (N-ACTION)

An N-ACTION Request is issued to instruct the Print SCP to print the contents of the Film Box. The Action Reply argument in an N-ACTION response is not evaluated.

The behavior of HARDCOPY-SCU when encountering status codes in a N-ACTION response is summarized in the Table below:

Table 66: FILM BOX SOP CLASS N-ACTION RESPONSE STATUS HANDLING BEHAVIOR

| Service Status | Further Meaning | Status Codes | Behavior | Related Fields |
|----------------|-----------------|--------------|--|----------------|
| Success | Success | 0000 | The SCP has completed the operation successfully. | - |
| * | Failure | Any other | The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user. | - |

5.2.8.5.1.4.3.3 Film Box SOP Class Operations (N-DELETE)

The attributes supplied in an N-DELETE Request are listed in the Table below:

Table 67: IMAGE BOX SOP CLASS N-SET RESPONSE STATUS HANDLING BEHAVIOR

| Service Status | Further Meaning | Status Codes | Behavior | Related Fields |
|----------------|-----------------|--------------|---|----------------|
| Success | Success | 0000 | The SCP has completed the operation successfully. | - |

| Service Status | Further Meaning | Status Codes | Behavior | Related Fields |
|----------------|-----------------|--------------|--|----------------|
| * | Failure | Any other | The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user. | - |

5.2.8.5.1.4.4. SOP Specific Conformance for the Image Box SOP Class

HARDCOPY-SCU supports the following DIMSE operations for the Image Box SOP Class:

□ N-SET

Details of the supported attributes and status handling behavior are described in the following subsections.

5.2.8.5.1.4.4.1 Image Box SOP Class Operations (N-SET)

The attributes supplied in an N-SET Request are listed in the Table below:

Table 68: IMAGE BOX SOP CLASS N-SET REQUEST ATTRIBUTES

| Name | Tag | Value | Presence | Source |
|--------------------------------|-------------|------------------|----------|--------|
| Image Position | (2020,0010) | From image index | ALWAYS | Auto |
| Basic Grayscale Image Sequence | (2010,0110) | | ALWAYS | Auto |
| >Samples Per Pixel | (0028,0002) | Image dependent | ALWAYS | Auto |
| >Photometric Interpretation | (0028,0004) | Image dependent | ALWAYS | Auto |
| >Rows | (0028,0010) | Image dependent | ALWAYS | Auto |
| >Columns | (0028,0011) | Image dependent | ALWAYS | Auto |
| >Pixel Aspect Ratio | (0028,0034) | Image dependent | ALWAYS | Auto |
| >Bits Allocated | (0028,0100) | Image dependent | ALWAYS | Auto |
| >Bits Stored | (0028,0101) | Image dependent | ALWAYS | Auto |
| >High Bit | (0028,0102) | Image dependent | ALWAYS | Auto |
| >Pixel Representation | (0028,1003) | Image dependent | ALWAYS | Auto |
| >Pixel Sequence | (7FEO,0010) | Pixels of image | ALWAYS | Auto |

The behavior of HARDCOPY-SCU when encountering status codes in a N-SET response is summarized in the Table below:

Table 69: IMAGE BOX SOP CLASS N-SET RESPONSE STATUS HANDLING BEHAVIOR

| Service Status | Further Meaning | Status Codes | Behavior | Related Fields |
|----------------|-----------------|--------------|-------------------------------------|----------------|
| Success | Success | 0000 | The SCP has completed the operation | - |

| Service Status | Further Meaning | Status Codes | Behavior | Related Fields |
|----------------|-----------------|--------------|--|----------------|
| | | | successfully. | |
| * | Failure | Any other | The Association is aborted using A-ABORT and the print-job is marked as failed. The status meaning is logged and reported to the user. | - |

5.3. NETWORK INTERFACES

5.3.1. Physical Network Interface

Ginkgo CADx Framework is indifferent to the physical medium over which TCP/IP executes; which is dependent on the underlying operating system and hardware.

5.3.2. Additional Protocols

When host names rather than IP addresses are used in the configuration properties to specify presentation addresses for remote AEs, the application is dependent on the name resolution mechanism of the underlying operating system.

5.4. CONFIGURATION

All configuration is performed through the use of Ginkgo CADx INI file(s) stored in pre-defined locations that are specific to the underlying operating system. Refer to the Release Notes for specific details.

5.4.1. AE Title/Presentation Address Mapping

The Calling AE Title of the local application is configurable in the preferences file, and is shared by all of the AEs. The mapping of the logical name by which remote AEs are described in the user interface to Called AE Titles as well as presentation address (hostname or IP address and port number) is configurable in the INI file.

5.4.2. Parameters

Table 70: CONFIGURATION PARAMETERS TABLE

| Parameter | Configurable | Default Value |
|---|--------------|---------------|
| General Parameters | | |
| PDU Size | Yes | 16kB |
| Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout) | No | 15s |
| General DIMSE level time-out values | No | 10min |
| Time-out waiting for response to TCP/IP connect() request. (Low-level timeout) | No | 15s |
| Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level | No | 15s |

| Parameter | Configurable | Default Value |
|--|--------------|--|
| timeout) | | |
| Time-out for waiting for data between TCP/IP packets. (Low-level timeout) | No | 15s |
| Any changes to default TCP/IP settings, such as configurable stack parameters. | No | None |
| AE Specific Parameters | | |
| Size constraint in maximum object size | No | Unlimited |
| Maximum PDU size the AE can receive ¹ | No | Unlimited |
| Maximum PDU size the AE can send | No | Unlimited |
| AE specific DIMSE level time-out values | No | 10min |
| Number of simultaneous Associations by Service and/or SOP Class | No | Unlimited |
| SOP Class support | Yes | All supported SOP Classes always proposed and accepted |
| Transfer Syntax support | Yes | All supported SOP Classes always proposed and accepted |
| Other parameters that are configurable | No | None |

5.4.2.1. Local AE Titles.

The local AE title mapping and configuration shall be specified.

5.4.2.2. Remote AE Title/Presentation Address Mapping

Configuration of remote host names and port numbers shall be specified.

5.4.2.2.1. Remote SCPs

Configuration of the remote AET port number, host-names, IP addresses and capabilities shall be specified. If applicable, multiple remote SCP's can be specified.

¹ Though the application can support unlimited PDU sizes, it will never offer a Maximum Received PDU Length of zero (unlimited) since this triggers a bug in some older systems.

6. MEDIA INTERCHANGE

6.1. IMPLEMENTATION MODEL

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

6.1.1. Application Data Flow

Ginkgo CADx Framework is a single pure native C++ application that provides a user interface, network support and media support as a File Set Reader.

Conceptually it may be modeled as the following single AE:

- MEDIA-FSR, which loads a user-selected PS 3.10 compliant file, which may be a DICOMDIR or an image or spectroscopy object, either from the local file system or from PS 3.12 compliant media according to one of the General Purpose Media Application Profiles of PS 3.11 (CD-R, DVD-RAM or USB drive)

In effect, the application is media-neutral, since the user is required to browse and locate the DICOMDIR file. Furthermore, any DICOM image or spectroscopy object encoded in one of the standard Transfer Syntaxes may be loaded, even in the absence of a PS 3.10 compliant meta-information header, in which case a “best guess” at the Transfer Syntax will be made.

6.1.2. Functional definitions of AE's

6.1.2.1. MEDIA-FSR

MEDIA-FSR is activated through the user interface to select directories, images and spectra for display, import into the local database or network transmission.

6.1.2.2. MEDIA-FSU

MEDIA-FSU is activated through the user interface to select patient studies from database and export into the specified media or network transmission.

6.1.3. Sequencing of Real World Activities

All FSR activities are sequentially initiated in the user interface, and another activity may not be initiated until the prior activity has completed.

6.2. AE SPECIFICATIONS

6.2.1. MEDIA-FSR

MEDIA-FSR provides standard conformance to DICOM Interchange Option of the Media Storage Service Class.

Table 71: APPLICATION PROFILES, ACTIVITIES, AND ROLES FOR MEDIA-FSR

| Application Profiles Supported | Real World Activity | Role | SC Option |
|--------------------------------|------------------------|------|-------------|
| STD-GEN-CD | Load directory or file | FSR | Interchange |
| STD-GEN-DVD-RAM | Load directory or file | FSR | Interchange |
| STD-GEN-USB | Load directory or file | FSR | Interchange |

6.2.1.1. File Meta Information for the Application Entity

Not applicable, since MEDIA-FSR is not an FSC or FSU

6.2.2. MEDIA-FSC

MEDIA-FSC provides standard conformance to DICOM Interchange Option of the Media Storage Service Class.

Table 72: APPLICATION PROFILES, ACTIVITIES, AND ROLES FOR MEDIA-FSC

| Application Profiles Supported | Real World Activity | Role | SC Option |
|--------------------------------|---------------------------|------|-------------|
| STD-GEN-CD | Save to directory or file | FSC | Interchange |
| STD-GEN-DVD-RAM | Save to directory or file | FSC | Interchange |
| STD-GEN-USB | Save to directory or file | FSC | Interchange |

6.2.2.1. File Meta Information for the Application Entity

None.

6.2.2.2. Real World Activities**6.2.2.2.1. Activity – Load Directory or File**

MEDIA-FSR is activated through the user interface when a user selects the File load operation.

If the loaded file is a DICOMDIR, a browser will be displayed, from which instances may be selected and in turn loaded for display, imported into the local database or sent to a remote AE over the network.

If the file is an image or spectroscopy instance, it will be loaded and displayed.

6.2.2.2.1.1. Application Profile Specific Conformance

There are no extensions or specializations.

6.2.2.2.2. Activity – Save Directory or File

MEDIA-FSC is activated through the user interface when a user selects the Export operation.

If the export type is a DICOMDIR, a browser will be displayed, from which instances may be selected, exported to media or sent to a remote AE over the network.

6.2.2.2.1. Application Profile Specific Conformance

There are no extensions or specializations.

6.3. AUGMENTED AND PRIVATE PROFILES

6.3.1. Augmented Profiles

None.

6.3.2. Private Profiles

None.

6.4. MEDIA CONFIGURATION

None.

7. SUPPORT OF CHARACTER SETS

7.1. OVERVIEW

The application supports all extended character sets defined in the DICOM 2002 standard, including single-byte and multi-byte character sets as well as code extension techniques using ISO 2022 escapes.

Support extends to correctly decoding and displaying the correct symbol for all names and strings found in the DicomDIR, in storage instances from media and received over the network, and in the local database.

No specific support for sorting of strings other than in the default character set is provided in the browsers.

7.2. CHARACTER SETS

The following Defined Terms for Specific Character Set repertoire is supported:

Table 73: SUPPORTED SPECIFIC CHARACTER SET DEFINED TERMS

| Character Set Description | Defined Term |
|---------------------------|--------------|
| UTF-8 | ISO_IR 192 |

7.3. CHARACTER SET CONFIGURATION

Whether or not characters are displayed correctly depends on the presence of font support in the underlying operating system. Typically, as described in the Release Notes, it may be necessary for the user to add one of the “all Unicode” fonts to their system configuration in order to correctly display characters that would not typically be used in the default locale (UTF-8).

8. SECURITY

8.1. SECURITY PROFILES

Ginkgo CADx SCUs conforms to the TLS layer security profile for both authentication and data privacy.

Username/Password Negotiation is also supported.

8.2. ASSOCIATION LEVEL SECURITY

None supported.

Any Calling AE Titles and/or IP addresses may open an Association.

8.3. APPLICATION LEVEL SECURITY

Username/Password authentication is supported when specific Ginkgo CADx Framework profile is enabled.

9. ANNEXES

9.1. IOD CONTENTS

9.1.1. Created SOP Instances

The following tables use a number of abbreviations. The abbreviations used in the “Presence of...” column are:

- VNAP Value Not Always Present.
- ANAP Attribute Not Always Present.
- ALWAYS Always Present.
- EMPTY Attribute is sent without value.

The abbreviations used in the “Source” column:

- MWL The attribute value source Modality Worklist.
- INT The attribute value source is XML Integration or user input.
- USER The attribute value source is from User input only.
- AUTO The attribute value is generated automatically.
- MPPS The attribute value is the same as that use for Modality Performed Procedure Step.
- CONFIG The attribute value source is a configurable parameter.

Note: Ginkgo CADx integration workflow allows to overwrite any attribute implicitly specified its XML integration workflow file.

9.1.1.1. VL PHOTOGRAPHIC IMAGE IOD

Reference: Digital Imaging and Communications in Medicine (DICOM) Supplement 15: Visible Light Image for Endoscopy, Microscopy, and Photography.

UID Value: 1.2.840.10008.5.1.4.1.1.77.1.4.

UID Name: VLPhotographicImageStorage.

Category: Image.

Table 74: IOD OF CREATED VL PHOTOGRAPHIC SOP INSTANCES

| IE | Module | Reference | Presence of Module |
|---------|----------------|-----------|--------------------|
| Patient | Patient | Table 80 | ALWAYS |
| Study | General Study | Table 81 | ALWAYS |
| | Patient Study | Table 82 | ALWAYS |
| Series | General Series | Table 83 | ALWAYS |

| IE | Module | Reference | Presence of Module |
|-----------|--------------------------|-----------|---|
| Equipment | General Equipment | Table 84 | ALWAYS |
| Image | General Image | Table 85 | ALWAYS |
| | Image Pixel | Table 86 | ALWAYS |
| | SOP Common | Table 87 | ALWAYS |
| Private | Private Application | Table 89 | Only if reported. |
| | Retinal Retinal Diagnose | Table 90 | Only if generated by retinal Extension. |

9.1.1.1.1. Transfer syntaxes

Table 75: TRANSFER SYNTAXES OF CREATED VL PHOTOGRAPHIC SOP INSTANCES

| UID | Name |
|----------------------------------|------------------------------------|
| 1.2.840.10008.1.2.4.50 (default) | JPEGProcess1TransferSyntax |
| 1.2.840.10008.1.2.4.55 | JPEGProcess10_12TransferSyntax |
| 1.2.840.10008.1.2.4.70 | JPEGProcess14SV1TransferSyntax |
| 1.2.840.10008.1.2 | LittleEndianImplicitTransferSyntax |
| 1.2.840.10008.1.2.1 | LittleEndianExplicitTransferSyntax |
| 1.2.840.10008.1.2.2 | BigEndianExplicitTransferSyntax |

9.1.1.1.2. Specific Character set

The value of specific character set (0008,0005) shall be ISO_IR 192

9.1.1.1.3. Conversion type

The value of Conversion Type (0008,0064) shall be WSD

9.1.1.1.4. Modality

The value of Modality (0008,0060) should be XC.

9.1.1.1.5. Photometric Interpretation

The Enumerated Values of Photometric Interpretation (0028,0004) shall be:

YBR_FULL_422

9.1.1.1.6. Bits Allocated, Bits Stored, and High Bit

The Enumerated Value of Bits Allocated (0028,0100) shall be 8; the Enumerated Value of Bits Stored (0028,0101) shall be 8; and the Enumerated Value of High Bit (0028,0102) shall be 7.

9.1.1.1.7. Pixel Representation

The Enumerated Value of Pixel Representation (0028,0103) shall be 0000H.

Note: A value of 0000H signifies an unsigned integer value.

9.1.1.1.8. Samples per Pixel

The Enumerated Values of Samples per Pixel (0028,0002) shall be:

As the Photometric Interpretation (0028,0004) is YBR_FULL_422, then the Enumerated Value of Samples per Pixel (0028,0002) shall be three (3).

9.1.1.1.9. Planar Configuration

If present, the Enumerated Value of Planar Configuration (0028,0006) shall be 0000H. This value shall be always present as Samples per Pixel (0028,0002) has a value greater than 1.

9.1.1.1.10. Image Type

The Image Type attribute identifies important image characteristics in a multiple valued data element. For Visible Light, Image Type is specialized as follows:

- a) Value 1 shall identify the Pixel Data Characteristics. Enumerated Values are: ORIGINAL and DERIVED.
- b) Value 2 shall identify the Patient Examination Characteristics. Enumerated Values are: PRIMARY and SECONDARY.

9.1.1.2. VIDEO PHOTOGRAPHIC IMAGE IOD

Reference: Digital Imaging and Communications in Medicine (DICOM)
Supplement 47: Visible LightVideo.

UID Value: 1.2.840.10008.5.1.4.1.1.77.1.4.1.

UID Name: VideoPhotographicImageStorage.

Category: Image.

Table 76: IOD OF CREATED VIDEO PHOTOGRAPHIC SOP INSTANCES

| IE | Module | Reference | Presence of Module |
|-----------|-------------------|-----------|--------------------|
| Patient | Patient | Table 80 | ALWAYS |
| Study | General Study | Table 81 | ALWAYS |
| | Patient Study | Table 82 | ALWAYS |
| Series | General Series | Table 83 | ALWAYS |
| Equipment | General Equipment | Table 84 | ALWAYS |
| Image | General Image | Table 85 | ALWAYS |
| | Image Pixel | Table 86 | ALWAYS |
| | SOP Common | Table 87 | ALWAYS |

9.1.1.2.1. Transfer syntaxes

Table 77: TRANSFER SYNTAXES OF CREATED VIDEO PHOTOGRAPHIC SOP INSTANCES

| UID | Name |
|-----------------------------------|-----------------------------|
| 1.2.840.10008.1.2.4.100 (default) | MPEG2MainProfileAtMainLevel |

9.1.1.2.2. Specific Character set

The value of specific character set (0008,0005) shall be ISO_IR 192

9.1.1.2.3. Modality

The value of Modality (0008,0060) should be XC.

9.1.1.2.4. Photometric Interpretation

The Enumerated Values of Photometric Interpretation (0028,0004) shall be:

YBR_PARTIAL_420

9.1.1.2.5. Bits Allocated, Bits Stored, and High Bit

The Enumerated Value of Bits Allocated (0028,0100) shall be 8; the Enumerated Value of Bits Stored (0028,0101) shall be 8; and the Enumerated Value of High Bit (0028,0102) shall be 7.

9.1.1.2.6. Pixel Representation

The Enumerated Value of Pixel Representation (0028,0103) shall be 0000H.

Note: A value of 0000H signifies an unsigned integer value.

9.1.1.2.7. Samples per Pixel

The Enumerated Values of Samples per Pixel (0028,0002) shall be:

As the Photometric Interpretation (0028,0004) is YBR_PARTIAL_420, then the Enumerated Value of Samples per Pixel (0028,0002) shall be three (3).

9.1.1.2.8. Planar Configuration

If present, the Enumerated Value of Planar Configuration (0028,0006) shall be 0000H. This value shall be always present as Samples per Pixel (0028,0002) has a value greater than 1.

9.1.1.2.9. Image Type

The Image Type attribute identifies important image characteristics in a multiple valued data element. For Visible Light, Image Type is specialized as follows:

- c) Value 1 shall identify the Pixel Data Characteristics. Enumerated Values are: ORIGINAL and DERIVED.
- d) Value 2 shall identify the Patient Examination Characteristics. Enumerated Values are: PRIMARY and SECONDARY.

9.1.1.3. ENCAPSULATED PDF IOD

Reference: Digital Imaging and Communication in Medicine.
Supplement 104: DICOM Encapsulation of PDF Documents.

UID Value: 1.2.840.10008.5.1.4.1.1.104.1

UID Name: Encapsulated PDF Storage SOP Class

Category: Transfer

Table 78: IOD OF CREATED ENCAPSULATED PDF SOP INSTANCES

| IE | Module | Reference | Presence of Module |
|-------------------|-------------------|-----------|--------------------|
| Patient | Patient | Table 80 | ALWAYS |
| Study | General Study | Table 81 | ALWAYS |
| | Patient Study | Table 82 | ALWAYS |
| Series | General Series | Table 83 | ALWAYS |
| Equipment | General Equipment | Table 84 | ALWAYS |
| Image | SOP Common | Table 87 | ALWAYS |
| Encapsulated Data | Encapsulated Data | Table 88 | ALWAYS |

9.1.1.3.1. Transfer syntaxes

Table 79: TRANSFER SYNTAXES OF CREATED ENCAPSULATED PDF SOP INSTANCES

| UID | Name |
|-------------------------------|------------------------------------|
| 1.2.840.10008.1.2.1 (default) | LittleEndianExplicitTransferSyntax |

9.1.1.3.2. Specific Character set

The value of specific character set (0008,0005) shall be ISO_IR 192

9.1.1.3.3. Conversion type

The value of Conversion Type (0008,0064) shall be SD

9.1.1.3.4. Modality

The value of Modality (0008,0060) should be SC.

9.1.1.4. COMMON MODULES

Table 80: PATIENT MODULE OF CREATED SOP INSTANCES

| Attribute Name | Tag | VR | Value | Presence | Source |
|----------------|------------|----|---|----------|---------|
| Patient's Name | 0010,0010) | PN | From Modality Worklist or integration. Maximum 64 characters. | VNAP | MWL/INT |

| Attribute Name | Tag | VR | Value | Presence | Source |
|----------------------------|-------------|----|---|----------|---------|
| Patient ID | (0010,0020) | LO | From Modality Worklist or integration. Maximum 64 characters. | VNAP | MWL/INT |
| Issuer of Patient ID | (0010,0021) | LO | From Modality Worklist. | ANAP | MWL |
| Other Patient Ids Sequence | (0010,1002) | SQ | From Modality Worklist. | ANAP | MWL |
| >Patient ID | (0010,0020) | LO | From Modality Worklist. | VNAP | MWL |
| >Issuer of Patient ID | (0010,0021) | LO | From Modality Worklist | VNAP | MWL |
| Patient's Birth Date | (0010,0030) | DA | From Modality Worklist or integration. | VNAP | MWL/INT |
| Patient's Sex | (0010,0040) | CS | From Modality Worklist or integration. | VNAP | MWL/INT |
| Admission ID | (0038,0011) | LO | From Modality Worklist | ANAP | MWL |
| Issuer of Admission ID | (0038,0014) | LO | From Modality Worklist | ANAP | MWL |

Table 81: GENERAL STUDY MODULE OF CREATED SOP INSTANCES

| Attribute Name | Tag | VR | Value | Presence | Source |
|----------------------------|-------------|----|--|----------|-----------|
| Study Instance UID | (0020,000D) | UI | From Modality Worklist or generated by device | ALWAYS | MWL/AUTO |
| Study Date | (0008,0020) | DA | <yyyymmdd> | ALWAYS | USER/AUTO |
| Study Time | (0008,0030) | TM | <hhmmss> | ALWAYS | USER/AUTO |
| Referring Physician's Name | (0008,0090) | PN | From Modality Worklist or integration workflow | VNAP | MWL/INT |
| Accession Number | (0008,0050) | SH | From Modality Worklist or generated by device. | VNAP | MWL/AUTO |
| Study Description | (0008,1030) | LO | Comment text box. Maximum 1024 characters. | VNAP | USER |
| Referenced Study Sequence | (0008,1110) | SQ | From Modality Worklist. | ANAP | MWL |
| >Referenced SOP Class UID | (0008,1150) | UI | From Modality Worklist. | ANAP | MWL |

| Attribute Name | Tag | VR | Value | Presence | Source |
|------------------------------|-------------|----|-------------------------|----------|--------|
| >Referenced SOP Instance UID | (0008,1155) | UI | From Modality Worklist. | ANAP | MWL |

Table 82: PATIENT STUDY MODULE OF CREATED SOP INSTANCES

| Attribute Name | Tag | VR | Value | Presence | Source |
|------------------|-------------|----|--|----------|----------|
| Patient's Age | (0010,1010) | AS | From Modality Worklist or automatic calculation. | VNAP | MWL/AUTO |
| Patient's Weight | (0010,1030) | DS | From Modality Worklist or user input. | ANAP | MWL/USER |

Table 83: GENERAL SERIES MODULE OF CREATED SOP INSTANCES

| Attribute Name | Tag | VR | Value | Presence | Source |
|--|-------------|----|---|----------|-----------|
| Modality | (0008,0060) | CS | From modality Worklist or IOD default value specification. | ALWAYS | MWL/AUTO |
| Series Instance UID | (0020,000E) | UI | Generated by device | ALWAYS | AUTO |
| Series Date | (0008,0021) | DA | <yyyymmdd> | ALWAYS | USER/AUTO |
| Series Time | (0008,0031) | TM | <hhmmss> | ALWAYS | USER/AUTO |
| Protocol Name | (0018,1030) | LO | Generated by device | ALWAYS | AUTO |
| Series Description | (0008,103E) | LO | Comment text box. Maximum 1024 characters. | VNAP | USER |
| Referenced Performed Procedure Step Sequence | (0008,1111) | SQ | Identifies the MPPPS SOP Instance to which this image is related. | ANAP | MPPS |
| >Referenced SOP Class UID | (0040,1150) | UI | MPPS SOP Class UID | ANAP | MPPS |
| >Referenced SOP Instance UID | (0008,1155) | UI | MPPS SOP Instance UID | ANAP | MPPS |

Table 84: GENERAL EQUIPMENT MODULE OF CREATED SOP INSTANCES

| Attribute Name | Tag | VR | Value | Presence | Source |
|----------------------------|-------------|----|--|----------|--------|
| Manufacturer | (0008,0070) | LO | “MetaEmotion S.L. http://metaemotion.com” | ALWAYS | AUTO |
| Institution Name | (0008,0080) | LO | From user configuration. | VNAP | CONF |
| Station Name | (0008,1010) | SH | From Modality Worklist. | ANAP | MWL |
| Manufacturer Model Name | (0008,1090) | LO | From Ginkgo CADx Extension name. | ALWAYS | AUTO |

Table 85: GENERAL IMAGE MODULE OF CREATED SOP INSTANCES

| Attribute Name | Tag | VR | Value | Presence | Source |
|------------------------------|-------------|----|---|----------|--------|
| Instance Number | (0020,0013) | IS | Sequence generated by device. | ALWAYS | AUTO |
| Image Comments | (0020,4000) | LT | From user input. Maximum 1024 characters. | VNAP | USER |
| Patient Orientation | (0020,0020) | CS | Generated by device | EMPTY | AUTO |
| Image Position Patient | (0020,0032) | DS | Generated by device | ALWAYS | AUTO |
| Image Orientation Patient | (0020,0037) | DS | Generated by device | ALWAYS | AUTO |

Table 86: IMAGE PIXEL MODULE OF CREATED SOP INSTANCES

| Attribute Name | Tag | VR | Value | Presence | Source |
|----------------|-------------|----|----------------------|----------|--------|
| Pixel Data | (7FE0,0010) | OW | The image pixel data | ALWAYS | AUTO |

Table 87: SOP COMMON MODULE OF CREATED SOP INSTANCES

| Attribute Name | Tag | VR | Value | Presence | Source |
|---------------------------|-------------|----|------------------------|----------|--------|
| Specific Character Set | (0008,0005) | CS | ISO_IR 192 | ALWAYS | AUTO |
| SOP Class UID | (0008,0016) | UI | From IOD Specification | ALWAYS | AUTO |
| SOP Instance UID | (0008,0018) | UI | Generated by device | ALWAYS | AUTO |

Table 88: ENCAPSULATED DATA MODULE OF CREATED SOP INSTANCES

| Attribute Name | Tag | VR | Value | Presence | Source |
|------------------------------------|-------------|----|---------------------|----------|--------|
| Encapsulated Document | (0042,0011) | OB | Generated by device | ALWAYS | AUTO |
| MIME Type of Encapsulated Document | (0034,0012) | LO | “application/pdf” | ALWAYS | AUTO |

9.1.2. Usage of attributes from received IOD's

The local database, remote query and directory browsers make use of the conventional identification attributes to distinguish patients, studies, series and instances. In particular, if two patients have the same value for Patient ID, they will be treated as the same in the browser and the local database.

9.1.3. Attribute Mapping

Not applicable.

9.1.4. Coerced/Modified fields

No coercion is performed.

9.1.5. DATA DICTIONARY OF PRIVATE ATTRIBUTES

Ginkgo CADx reserves private attribute values in group XXXX. The private attributes added to created SOP Instance are listed in the following table:

Table 89: PRIVATE APPLICATION MODULE OF CREATED SOP INSTANCES

| Attribute Name | Tag | VR | Value | Presence | Source |
|---------------------------------|-------------|----|------------------------|----------|--------|
| PrivateCreator | (0011,0010) | SH | Ginkgo CADx module UID | ALWAYS | AUTO |
| Serialized diagnose and markers | (0011,100B) | LT | Generated by device | ANAP | AUTO |
| KeyFile Indicator | (0011,1101) | LT | Generated by device | ANAP | AUTO |

Ginkgo CADx Retinal Extension adds the following private attributes to its created SOP Instances:

Table 90: PRIVATE RETINAL MODULE OF CREATED SOP INSTANCES

| Attribute Name | Tag | VR | Value | Presence | Source |
|------------------------------------|-------------|----|---------------------------------|----------|--------|
| Private Creator | (0011,0010) | SH | “METAEMOTION GINKGO RETINAL” | ALWAYS | AUTO |
| Serialized diagnose and markers | (0011,100B) | LT | Generated by device | ANAP | AUTO |
| Virtual Aneritra Contrast Image | (0011,100c) | UN | Generated by device | ANAP | AUTO |
| KeyFile Indicator | (0011,1101) | LT | Generated by device | ANAP | AUTO |

9.1.6. CODED TERMINOLOGY AND TEMPLATES

The value for Code Meaning will be displayed for all code sequences. No local lexicon is provided to look up alternative code meanings.

9.1.7. GRAYSCALE IMAGE CONSISTENCY

The high resolution display monitor attached to the product can be calibrated according to the Grayscale Standard Display Function (GSDF). The Service/Installation Tool is used together with a luminance meter to measure the Characteristic Curve of the display system and the current ambient light. See the product Service Manual for details on the calibration procedure and supported calibration hardware. The result of the calibration procedure is a Monitor Correction LUT that will be active within the display subsystem after a system reboot.

9.1.8. STANDARD EXTENDED/SPECIALIZED/PRIVATE SOP CLASSES

9.1.8.1. Standard Extended VL Visible Light Photography

See 9.1.1.1 VL PHOTOGRAPHIC IMAGE IOD

9.1.8.2. TRANSFER SYNTAXES

See 9.1.1.1.1 Transfer syntaxes

9.1.9. PRIVATE TRANSFER SYNTAXES

None.