syngo.share / Release VA28B / 2020-07-28 / Revision 5017

DICOM 3.0 Conformance Statement

SIEMENS Healthineers

Contents

1 Introduction

This document is a DICOM 3.0 Conformance Statement that describes the DICOM capabilities for the following six products and components of *syngo*.share:

- *DicomServer*
- *EventServer*
- *syngo*.share view
- *syngo*.share import
- *webadmin*
- *webrenderserver*

DicomServer is the central module for medical data processing in *syngo*.share. As hospital-wide solution for PACS, image and document management, *syngo*.share collects all image data and documents within your hospital processing them into the multimedia electronic patient record.

EventServer is able to generate DICOM Instance Availability Notifications (IANs for short), based on internal events or incoming DICOM MPPS requests, and sends them to one or more AEs.

syngo.share view is a versatile multi-modality displaying system for DICOM images. It is able to retrieve and display DICOM images either from specified directories or CD media or from *syngo*.share archive or with Query/Retrieve from third party PACS systems. Additionally *syngo*.share view supports printing and exporting DICOM images, series or studies on CD media.

syngo.share import is able to load DICOM images, series and studies from specified directories or CD media and import them into *syngo*.share.

webadmin is a Web 2.0 portal which enclosures Internet-Browser-based solutions in *syngo*.share. It offers a possibility for downloading DICOM images from *syngo*.share and storing it on a specified directory. This happens by the so called Web Access to DICOM Objects by URI (WADO-URI), as defined in DICOM 2019e PS 3.18.

webrenderserver provides a WADO-RS interface for the retrieval of rendered and thumbnail resources, as defined in DICOM 2019e PS 3.18.

1.1 Remarks

This Conformance Statement should help to validate the integration of *DicomServer*, *EventServer*, *syngo*.share view, *syngo*.share import, *webadmin*, and *webrenderserver* within a DICOM environment. This statement is not intended to replace the validation with other DICOM equipment to ensure proper exchange of information intended. Thus, it is still important to ensure the proper interoperability of the intended DICOM integration.

The user should be aware of the following important issues:

- The comparison of different Conformance Statements should be the first step towards the assessment of the interoperability within a DICOM environment
- Test procedures should be defined to validate the desired level of connectivity.

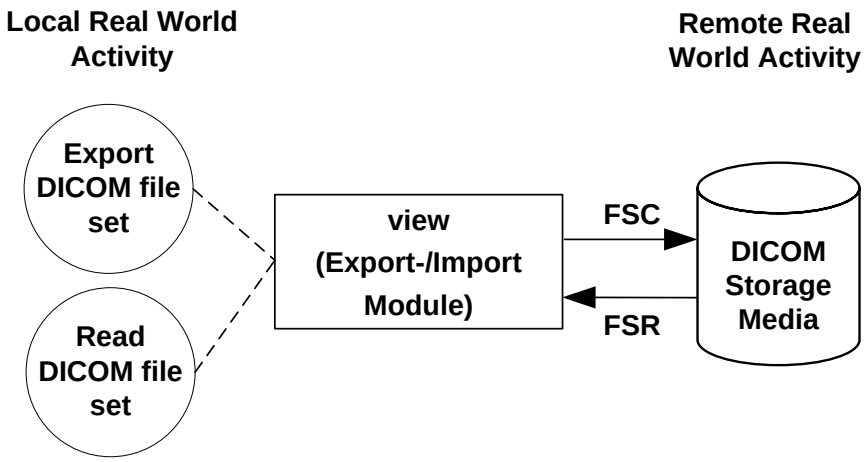
2 Implementation Model

2.1 Application Data Flow Diagram

2.1.1 *syngo*.share view Data Flow Diagram

syngo.share view and *syngo*.share view diagnostic[1] provide a user interface for reading (i.e. FSR) and exporting (i.e., FSC) DICOM files from portable media (e.g. CDs), network directories or the local file system. These functions are integral components of *syngo*.share view. However, within the context of this Conformance Statement the reading functionality is referred to as *syngo*.share view-FSR Application Entity (AE) and the exporting functionality as *syngo*.share view-FSC AE.

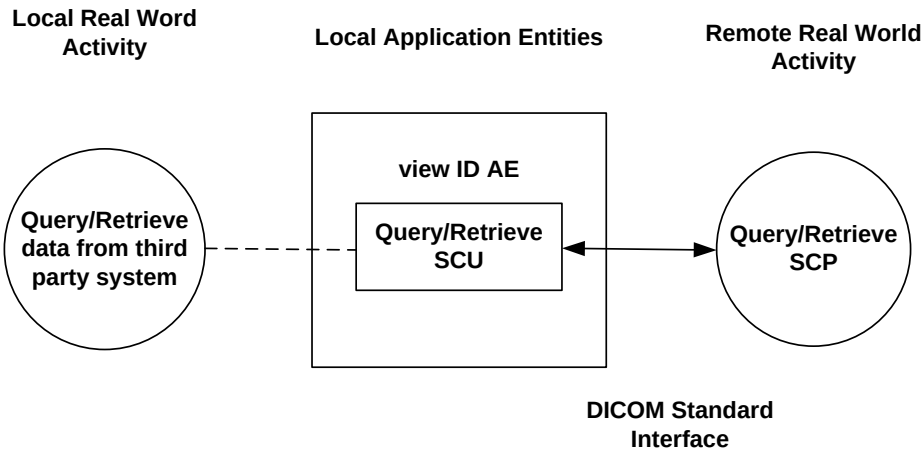
Figure 1: *syngo*.share view FSC and *syngo*.share view FSR Application Data Flow Diagram.



Additionally *syngo*.share view provides the ability to query third party PACS systems and retrieve data from them. *syngo*.share view also provides report reading capabilities for Structured Reports and the possibility to apply Grayscale Softcopy Presentation States (GSPS) as defined in DICOM 2013 PS 3.3. For display consistency the DICOM Grayscale Standard Display Function (GSDF) as described in DICOM 2013 PS 3.14 is supported. In this Conformance Statement the capabilities of *syngo*.share view as an image display are referred to as *syngo*.share view-ID AE.

[1] In the following *syngo*.share view diagnostic will not be mentioned explicitly each time, however, all information regarding *syngo*.share view applies to *syngo*.share view diagnostic as well.

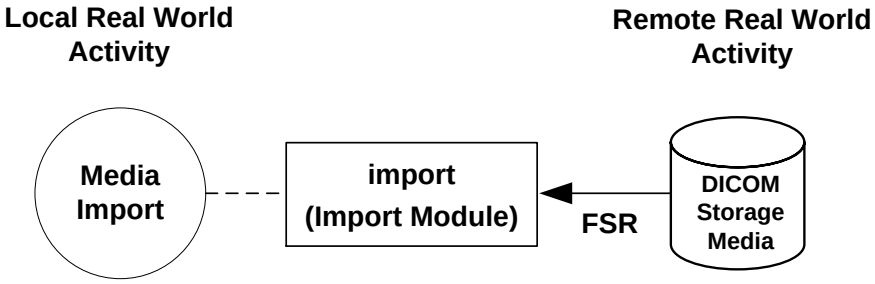
Figure 2: *syngo*.share view-ID AE Application Data Flow Diagram.



2.1.2 *syngo*.share import Data Flow Diagram

syngo.share import is able to read (i.e. FSR) DICOM files from portable media (e.g. CDs), network directories or the local file system. Loaded DICOM file sets can be imported directly into *syngo*.share. Within the context of this Conformance Statement the importing functionality of *syngo*.share import is referred to as *syngo*.share import-FSR AE.

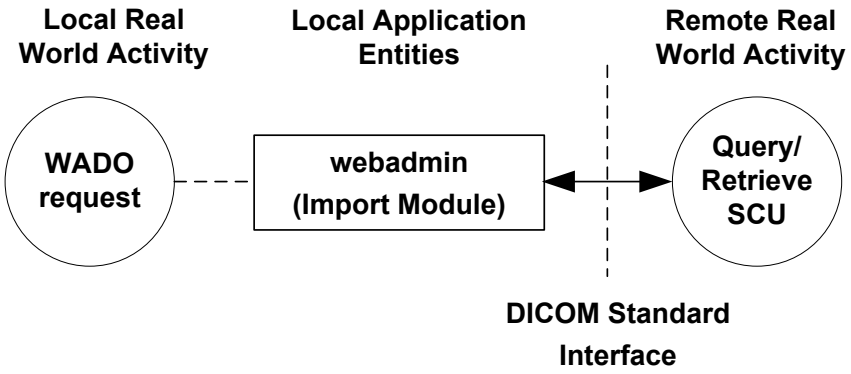
Figure 3: *syngo*.share import Data Flow Diagram.



2.1.3 *webadmin* Data Flow Diagram

webadmin offers download possibilities for DICOM images from *syngo*.share by using WADO-URI requests. The downloaded files can be stored anywhere on a portable media (e.g. CDs), network directory or the local file system.

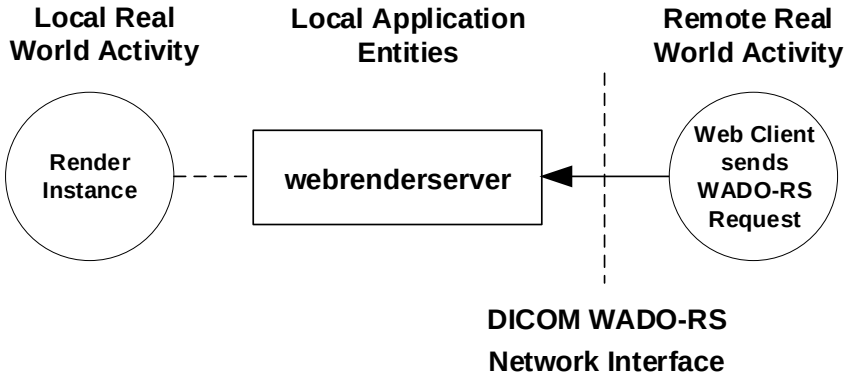
Figure 4: *webadmin* Data Flow Diagram.



2.1.4 *webrenderserver* Data Flow Diagram

webrenderserver provides a WADO-RS interface for the retrieval of rendered and thumbnail resources. It receives and responds to WADO-RS requests from a remote AE targeting on DICOM images stored in *syngo*.share.

Figure 5: *webrenderserver* Data Flow Diagram.

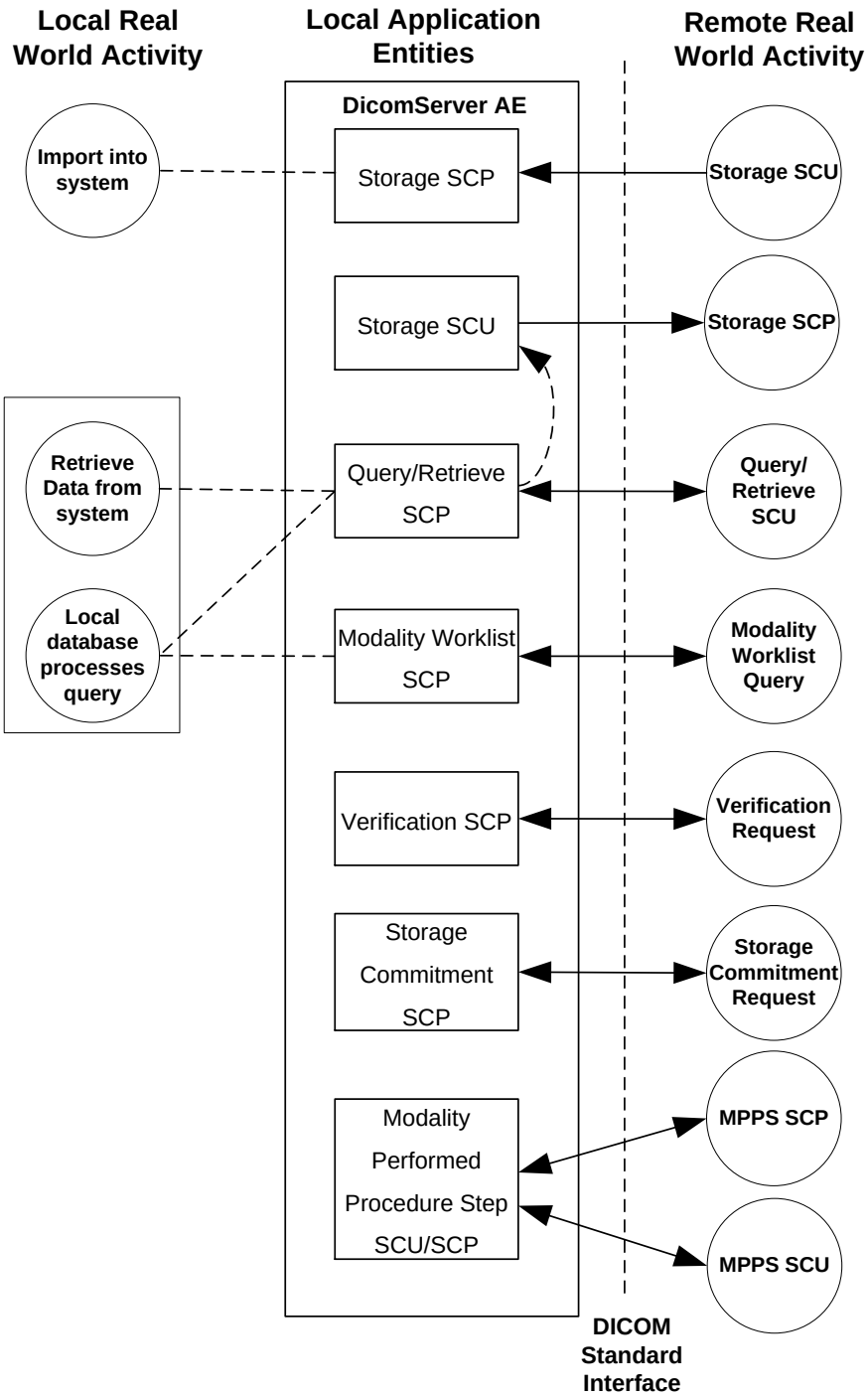


2.1.5 *DicomServer* Data Flow Diagram

DicomServer is implemented as a single AE which provides a set of different services. For each of these services *DicomServer* can act in a specific role.

By default the different services are accessible through one predefined AE title of an actual *DicomServer* instance.

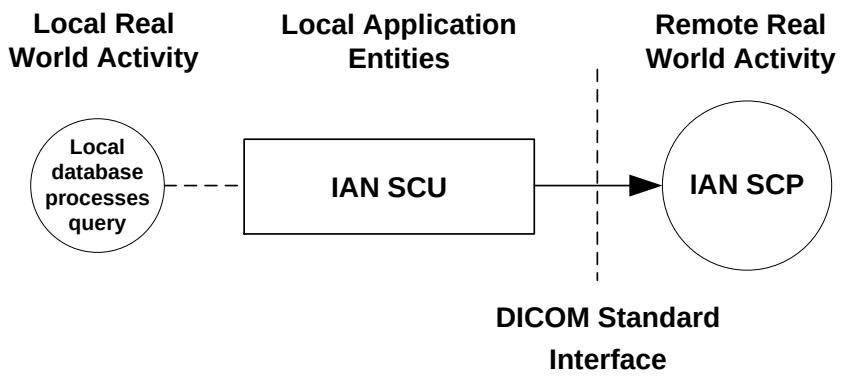
Figure 6: *DicomServer* Data Flow Diagram.



2.1.6 *EventServer* Data Flow Diagram

EventServer is able to generate DICOM IANs, based on internal events or incoming DICOM MPPS requests, and sends them to one or more AEs. In order to fulfill this task it supports the following services.

Figure 7: *EventServer* Data Flow Diagram.



2.2 Functional Definition of AEs

2.2.1 *syngo*.share view

The *syngo*.share view-/*syngo*.share view diagnostic[2]-FSR AE is able to read and *syngo*.share view-FSC AE is able to write user-selected DICOM files like DICOMDIR or image objects which are compliant to DICOM 2013 PS 3.10. These files can be located either on the local file system or DICOM 2013 PS 3.12 compliant media. Both AEs support the General Purpose CD-R Interchange Profile.

The *syngo*.share view-FSC AE allows the usage of any other third party CD editing software which can write directory structures to CDs. Thus, the *syngo*.share view-FSC AE basically is able to write DICOM file sets also to DVD-RAM.

The *syngo*.share view-ID AE is able to query third party PACS systems using the `C-FIND` Service and retrieve data using the `C-MOVE` Service according to DICOM 2013 PS 3.7. The third party PACS systems can be queried using the Study Root Query/ Retrieve Information Model as defined in DICOM 2013 PS 3.4, C.3.2. For `C-FIND` SCU and `C-MOVE` SCU baseline behavior is supported.

The *syngo*.share view-ID AE is able to render images and structured reports received using Query/ Retrieve or *syngo*.share view-FSR AE. All three general structured report document classes are supported. They are specified in DICOM 2013 PS 3.3. The contents are rendered as text with references to other instances. Referenced images can be shown and referenced GSPS can be applied. All spatial transformations, presentation LUTs and textual annotations are supported. Section 3.1 describes the supported SOP Classes for *syngo*.share view-ID.

2.2.2 *syngo*.share import

The *syngo*.share import-FSR AE is able to read user-selected DICOM files like DICOMDIR or image objects which are compliant to DICOM 2013 PS 3.10. These files can be located either on the local file system or DICOM 2013 PS 3.12 compliant media.

[2] In the following *syngo*.share view diagnostic will not be mentioned explicitly each time, however, all information regarding *syngo*.share view applies to *syngo*.share view diagnostic as well.

2.2.3 *webadmin*

The *webadmin* AE waits for a WADO-URI request from another application (e.g. an Internet Browser). If this happens, *webadmin* queries *syngo*.share for the requested DICOM image and returns it to the requesting application.

2.2.4 *webrenderserver*

The *webrenderserver* AE waits for incoming WADO-RS requests from remote AEs (e.g. from a web browser) for rendered and thumbnail resources according to DICOM 2019e PS 3.18. A remote AE can request rendered and thumbnail representations of DICOM images stored in *syngo*.share on study, series, instance, and frame level.

2.2.5 *DicomServer*

DicomServer AE waits for another application to connect and initiate a DICOM association. When another application connects, *DicomServer* AE expects it to be a DICOM application. *DicomServer* AE implements several DICOM Service Classes. In total the following services are provided by this AE:

- Verification SCP answers communication tests from remote applications – C-ECHO
- Storage SCP implements the answer to external `C-STORE` requests. It is able to receive incoming DICOM image files sent by remote DICOM applications (e.g., modalities or workstations) and add them to *syngo*.share database.
- The Query/Retrieve SCP implements the answer to `C-FIND`, `C-MOVE` and C-GET requests. Remote applications can request queries on Patient-, Study-, Series- or Image-level using the Patient Root or Study Root query model. *DicomServer* AE functions as a Storage SCU when responding to a `C-MOVE` request.
- `C-FIND` Spanning forwards incoming `C-FIND` requests unaltered to an arbitrary number of configured Query/Retrieve SCP targets and returns their results.
- `C-MOVE` Spanning forwards incoming `C-MOVE` requests to an arbitrary number of Query/Retrieve SCP targets.
- Modality Worklist SCP allows remote applications (e.g., modalities) to query the *syngo*.share database for modality worklists.
- Storage Commitment SCP implements the answer to external N-ACTION requests and sends back the N-EVENT-REPORT response. The response can be sent on either the incoming or on a newly established association.
- Modality Performed Procedure Step SCU/SCP implements the answer to external N-CREATE/N-SET requests and forwards the received requests to all configured destinations. The forwarding can be disabled.

On association startup the calling AET is looked up in the database to determine a corresponding configuration. This configuration determines the *DicomServer* behavior in several aspects including the number of services provided and the data accessible to the requesting AE.

2.2.6 EventServer

EventServer AE generates DICOM IANs, based on internal events or incoming DICOM MPPS requests, and sends them to one or more AEs.

2.3 Sequencing of Real-World Activities

- The services of *syngo*.share view and *syngo*.share import AEs can be requested at any time by the user through the user interface.
- The services of *webadmin* AE can be requested any time by the remote AE that performs the WADO-URI request.
- The services of *webrenderserver* AE can be requested any time by the remote AE that performs the WADO-RS request.
- The services of *DicomServer* AE must be requested according to the Service Class specifications in DICOM 2013 PS 3.3.
- The services of *EventServer* AE are triggered automatically.

3 Application Entity Specifications

syngo.share consists of multiple DICOM Application Entities . The following chapter describes the conformance of those entities with the DICOM Standard.

3.1 *syngo*.share view

syngo.share view and *syngo*.share view diagnostic[3] FSC and FSR provide functionalities for the sole purpose of handling DICOM media. The most commonly-used DICOM Storage SOP classes are supported, see Table 1. For SOP classes not listed in Table 1 viewing is possible, however the SOP class specific processing of the image data is not validated, e.g. multi-frame images (Enhanced CT/MR) might not be shown as expected.

3.1.1 Supported SOP Classes for *syngo*.share view AE

The supported DICOM SOP Classes are described in this chapter.

Table 1: Support Storage SOP Classes in *syngo*.share view

SOP Class Name	SOP Class UID	SCP	SCU
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	-	✔
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	-	✔
Digital x-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	-	✔
Digital x-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	-	✔
Digital Mammography x-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	-	✔
Digital Mammography x-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	-	✔
Digital Intra-Oral x-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	-	✔
Digital Intra-Oral x-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	-	✔
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	-	✔
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	-	✔
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.2	-	✔
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	-	✔
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	-	✔
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	-	✔
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	-	✔
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	-	✔
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	-	✔
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	-	✔
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	-	✔
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	-	✔
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	-	✔
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	-	✔
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	-	✔
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	-	✔

Table 1: Support Storage SOP Classes in syngo.share view...

[3] In the following *syngo*.share view diagnostic will not be mentioned explicitly each time, however, all information regarding *syngo*.share view applies to *syngo*.share view diagnostic as well.

... *Table 1: Support Storage SOP Classes in syngo.share view*

SOP Class Name	SOP Class UID	SCP	SCU
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	-	✔
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	-	✔
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	-	✔
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	-	✔
x-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	-	✔
Enhanced xA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	-	✔
x-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	-	✔
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	-	✔
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	-	✔
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	-	✔
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	-	✔
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	-	✔
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	-	✔
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	-	✔
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	-	✔
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	-	✔
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	-	✔
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	-	✔
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	-	✔
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	-	✔
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	-	✔
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	-	✔
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	-	✔
x-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	-	✔
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	-	✔
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	-	✔
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	-	✔
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	-	✔
DICOS Digital x-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.501.2.1	-	✔

Table 2: Supported Query/Retrieve SOP classes

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

Table 3: Supported Print Management SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	-	✔
Basic Annotation Box SOP Class	1.2.840.10008.5.1.1.15	-	✔
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	-	✔

3.1.2 Association Establishment Policies

3.1.2.1 General

syngo.share view-ID AE supports TCP/IP. Upon a user requesting a C-FIND operation it will attempt to establish an association with a remote AE. The host, port and remote application entity title are defined within the user configuration dialog. The maximum PDU size accepted is 16384.

3.1.2.2 Number of Associations

syngo.share view-ID AE supports a single association for C-FIND operations. So only one C-FIND operation is in progress at any time. It must be finished or cancelled to allow a new C-FIND. Only one C-MOVE at a time will open an association to a remote AE at any time.

3.1.2.3 Asynchronous Nature

The *syngo*.share view-ID AE will only allow a single outstanding operation on each association. Therefore it will not perform asynchronous negotiation.

3.1.2.4 Implementation Identifying Information

- Implementation Class UID

  1.2.276.0.7230010.3.0.3.6.1

- Implementation Version Name

  OFFIS_DCMTK_361

3.1.2.5 Association Initiation Policy by Real-World Activity

syngo.share view-ID AE initiates an association with a remote AE for C-FIND and C-MOVE requests. As a default the DICOM Implicit VR Little Endian Transfer Syntax (1.2.840.10008.1.2) as defined in DICOM 2013 PS 3.5, 10.1 is used. The accepted Transfer Syntaxes upon a sub association within a C-MOVE are defined in Table 4.

Table 4: Supported view C-MOVE Transfer Syntaxes

SOP Class Name	SOP Class UID
Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1
Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2

3.2 *syngo*.share webview

syngo.share webview and *syngo*.share webview diagnostic[4] FSC provide functionalities for the sole purpose of handling DICOM media. The most commonly-used DICOM Storage SOP classes are supported, see Table 5. For SOP classes not listed in Table 5 viewing is possible, however the SOP class specific processing of the image data is not validated, e.g. multi-frame images (Enhanced CT/MR) might not be shown as expected.

[4] In the following *syngo*.share webview diagnostic will not be mentioned explicitly each time, however, all information regarding *syngo*.share webview applies to *syngo*.share webview diagnostic as well.

3.2.1 Supported SOP Classes for *syngo*.share webview AE

The supported DICOM SOP Classes are described in this chapter.

Note that SOP Classes for the purpose of image data storage require that the DICOM Image Pixel Module exists in order to display image data. Also, a value must be provided in the DICOM Element PixelData (`7FE0,0010`), and the underlying Transfer Syntax must be supported.

Table 5: Support Storage SOP Classes in *syngo*.share webview

SOP Class Name	SOP Class UID	SCP	SCU
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	-	✔
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	-	✔
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	-	✔
Digital x-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	-	✔
Digital x-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	-	✔
Digital Mammography x-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	-	✔
Digital Mammography x-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	-	✔
Digital Intra-Oral x-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	-	✔
Digital Intra-Oral x-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	-	✔
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	-	✔
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	-	✔
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.2	-	✔
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	-	✔
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	-	✔
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	-	✔
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	-	✔
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	-	✔
Legacy Converted Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.4	-	✔
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	-	✔
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	-	✔
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	-	✔
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	-	✔
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	-	✔
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	-	✔
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	-	✔
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	-	✔
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	-	✔
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	-	✔
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	-	✔
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	-	✔
x-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	-	✔
Enhanced xA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	-	✔
x-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	-	✔
Enhanced xRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	-	✔
x-Ray Angiographic Bi-Plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3	-	✔
x-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	-	✔

Table 5: Support Storage SOP Classes in syngo.share webview...

... Table 5: Support Storage SOP Classes in syngo.share webview

SOP Class Name	SOP Class UID	SCP	SCU
x-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	-	✔
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	-	✔
Breast Projection x-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4	-	✔
Breast Projection x-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.13.1.5	-	✔
Intravascular Optical Coherence Tomography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.14.1	-	✔
Intravascular Optical Coherence Tomography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.14.2	-	✔
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	-	✔
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	-	✔
VL Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1	-	✔
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	-	✔
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	-	✔
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	-	✔
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	-	✔
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	-	✔
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	-	✔
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	-	✔
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	-	✔
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	-	✔
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	-	✔
Wide Field Ophthalmic Photography Stereographic Projection Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.5	-	✔
Wide Field Ophthalmic Photography 3D Coordinates Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.6	-	✔
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	-	✔
VL Multi-frame Image Storage - Trial (Retired)	1.2.840.10008.5.1.4.1.1.77.2	-	✔
Ophthalmic Thickness Map Storage	1.2.840.10008.5.1.4.1.1.81.1	-	✔
Corneal Topography Map Storage	1.2.840.10008.5.1.4.1.1.82.1	-	✔
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	-	✔
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	-	✔
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	-	✔
Legacy Converted Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.128.1	-	✔
Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.130	-	✔
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	-	✔
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	-	✔
DICOS CT Image Storage	1.2.840.10008.5.1.4.1.1.501.1	-	✔
DICOS Digital x-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.501.2.1	-	✔
DICOS Digital x-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.501.2.1	-	✔
Eddy Current Image Storage	1.2.840.10008.5.1.4.1.1.601.1	-	✔
Eddy Current Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.601.2	-	✔

3.2.2 *webrenderserver*

The *webrenderserver* AE provides a WADO-RS interface for the retrieval of rendered and thumbnail resources, as defined in and implemented according to DICOM 2019e PS 3.18.

3.2.2.1 WADO-RS General Notes

A remote AE can request rendered and thumbnail representations of DICOM images (color and grayscale) stored in *syngo*.share on study, series, instance, and frame level. WADO-RS requests are syntactically checked and are required to contain valid authorization information by means of URL signatures (HMAC) before getting processed. DICOM data for the requested resource are queried and are loaded from *syngo*.share, rendered according to the specified options in the request, and sent to the remote AE as a single- or multipart HTTP response. The HTTP status code of the WADO-RS response informs the remote AE about the outcome of processing the WADO-RS request.

Note
The WADO-RS interface supports the retrieve transaction on rendered resources as well as on thumbnail resources. Further target resources (e.g. DICOM resources) are not supported. Furthermore, the retrieve capabilities transaction is not implemented due to security considerations (WADL disclosure).

3.2.2.2 WADO-RS Rendered Resources

The supported rendered resources along with their associated URI templates are listed in Table 6.

Table 6: Rendered Resources

Resource	URI Template
Rendered Study	/studies/{study}/rendered
Rendered Series	/studies/{study}/series/{series}/rendered
Rendered Instance	/studies/{study}/series/{series}/instances/{instance}/rendered
Rendered Frames	/studies/{study}/series/{series}/instances/{instance}/frames/{frames}/rendered

The options and restrictions valid for all rendered resources are listed in Table 7.

Table 7: Options and Restrictions on Rendered Resources

Options	Restrictions
Accept (Request Header Field)	Restricted to image/jpeg, image/gif, image/png, or wildcard representations covering the three rendered media types.
Accept-Charset (Request Header Field)	Not applied as the response payload consists of bitmap images only.
Accept (Query Parameter)	Restricted to image/jpeg, image/gif, or image/png.
Charset (Query Parameter)	Not applied as the response payload consists of bitmap images only.
Annotation (Query Parameter)	Restricted to patient and/or technique. Other keywords are ignored and listed in a warning header in the response. Localization of the burned-in annotations (e.g. regarding date format) is based on the Accept-Language header field.
Quality (Query Parameter)	Restricted to JPEG quality if image/jpeg is requested.

Table 7: Options and Restrictions on Rendered Resources...

... Table 7: Options and Restrictions on Rendered Resources

Options	Restrictions
Viewport (Query Parameter)	Restricted to vw (viewport width) and vh (viewport height). Further parameter values are ignored. If viewport width and height are specified, the rendered images will be of the specified dimensions with black background color if padding is necessary.
Transfer Syntaxes Supported	Only DICOM instances of a supported transfer syntax are considered for rendering. For the list of supported transfer syntaxes, see Table 10.
SOP Class Restrictions	Only DICOM instances of a supported SOP Class are considered for rendering. Rendering is restricted to SOP Classes for the purpose of image storage - e.g. the DICOM Image Pixel Module exists along with the DICOM Element PixelData (`7FE0,0010`).
Size Restriction	There are no size limits imposed by the WADO-RS AE. However, depending on system resource and file format restrictions there might be limits to the size of each image.
Multi-Frame Image Handling	Each frame of a multi-frame image is rendered separately. Hence, each frame is returned as a part in case of a multi-part response. This is also the case if image/gif is the requested rendered media type.
Frames	The given frame numbers for rendered frames are expected to be in ascending order. If this is not the case, automatic sorting applies.

3.2.2.3 WADO-RS Thumbnail Resources

The supported thumbnail resources along with their associated URI templates are listed in Table 8.

Table 8: Thumbnail Resources

Resource	URI Template
Study Thumbnail	/studies/{study}/thumbnail
Series Thumbnail	/studies/{study}/series/{series}/thumbnail
Instance Thumbnail	/studies/{study}/series/{series}/instances/{instance}/thumbnail
Frame Thumbnail	/studies/{study}/series/{series}/instances/{instance}/frames/{frames}/thumbnail

The options and restrictions valid for all thumbnail resources are listed in Table 9.

Table 9: Options and Restrictions on Thumbnail Resources

Options	Restrictions
Accept (Request Header Field)	Restricted to image/jpeg, image/gif, image/png, or wildcard representations covering the three rendered media types.
Accept-Charset (Request Header Field)	Not applied as the response payload consists of a bitmap image only.
Accept (Query Parameter)	Restricted to image/jpeg, image/gif, or image/png.
Charset (Query Parameter)	Not applied as the response payload consists of a bitmap image only.
Viewport (Query Parameter)	If viewport width and height are specified, the rendered images will be of the specified dimensions with black background color if padding is necessary. Further parameter values are ignored.
Transfer Syntaxes Supported	The DICOM instance to render as a thumbnail is required to be of a supported transfer syntax. For the list of supported transfer syntaxes, see Table 10.

Table 9: Options and Restrictions on Thumbnail Resources...

... *Table 9: Options and Restrictions on Thumbnail Resources*

Options	Restrictions
SOP Class Restrictions	The DICOM instance to render as a thumbnail needs to be of a supported SOP Class. Rendering is restricted to SOP Classes for the purpose of image storage - e.g. the DICOM Image Pixel Module exists along with the DICOM Element PixelData (`7FE0,0010`).
Size Restriction	There are no size limits imposed by the WADO-RS AE. However, depending on system resource and file format restrictions there might be limits to the size of each image.
Frames	The given frame numbers for rendered frames are expected to be in ascending order. If this is not the case, automatic sorting applies.

Note
The first fame of the first instance of the first series is used to render the thumbnail.

3.2.2.4 WADO-RS Supported Transfer Syntaxes

The supported Transfer Syntaxes for all rendered resources and thumbnail resources are listed in Table 10.

Table 10: WADO-RS Supported Transfer Syntaxes

Transfer Syntax Name	UID
Implicit VR Little Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Deflated Explicit VR Little Endian	1.2.840.10008.1.2.1.99
Explicit VR Big Endian	1.2.840.10008.1.2.2
JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8-bit Image Compression	1.2.840.10008.1.2.4.50
JPEG Baseline (Processes 2 and 4): Default Transfer Syntax for Lossy JPEG 12-bit Image Compression (Process 4 only)	1.2.840.10008.1.2.4.51
JPEG Lossless, Nonhierarchical (Processes 14)	1.2.840.10008.1.2.4.57
JPEG Lossless, Nonhierarchical, First-Order Prediction (Processes 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70
JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80
JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81
JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
RLE Lossless	1.2.840.10008.1.2.5

3.2.2.5 WADO-RS Connection Policies

General

All standard RS connection policies apply. There are no extensions for RS options.

WADO-RS Endpoint URL

https://{host}/webrenderserver/rs/tenants/{tenant}

Please replace{host} and {tenant} in the URL with the corresponding host and tenant name.

Security

To protect the WADO-RS interface from unauthorized access special attention is paid to security aspects. Only requests over HTTPS are accepted by the WADO-RS AE. On top, requests are required to contain valid authorization information by means of URL signatures (HMAC). Please note that the WADO-RS service is not enabled per default in the *webrenderserver*. For general information about configuration and URL signatures, please consult the *syngo*.share Interface and Integration Manual.

Number of Connections

The WADO-RS AE itself does not limit the number of simultaneous requests. However, in standard deployments the number of simultaneous HTTP connections might be limited by HAProxy.

Synchronous and Asynchronous Requests

The WADO-RS AE only supports synchronous requests.

Response Status

The response message header contains a HTTP status code indicating success or failure, as listed in Table 11.

Table 11: WADO-RS HTTP Status Codes

Code	Name	Description
200	OK	The requested resource has been fetched successfully and is returned in the message body.
206	Partial Content	Indicates that for the requested resource (rendered resource) one or more DICOM instances are of a not supported SOP Class and are omitted in the response.
400	Bad Request	The request is malformed. Details are returned in the payload of the response.
403	Forbidden	The WADO-RS AE is refusing action as no or (only) an invalid authentication (URL signature) is present.
404	Not Found	The WADO-RS AE could not find the specified resource. This response status is also used to indicate that no applicable DICOM instance for thumbnail generation was found.
405	Method Not Allowed	Indicates a function parameter keyword other than linear is used in the window query parameter.
406	Not Acceptable	The remote AE did not provide any rendered media type in the accept header field and accept query parameter.
500	Internal Server Error	The WADO-RS AE encountered an error while processing the request.

Warning Header

The response message header contains a HTTP Warning header field with the number of not rendered instances in case the response status is 206 (Partial Content). Furthermore, if unsupported annotation keywords are given in the request, the unsupported keywords are listed in the HTTP Warning header field.

3.3 *syngo*.share import

The *syngo*.share import-FSR solely provides functionalities for handling DICOM media.

3.4 *syngo*.share VNA

syngo.share VNA is made up of multiple DICOM Application Entities (AE). This chapter describes the conformance of those entities.

3.4.1 *webadmin*

The *webadmin* AE solely provides functionality for retrieving DICOM media.

3.4.2 *DicomServer*

3.4.2.1 Supported SOP Classes and Transfer Syntaxes

DicomServer AE provides Standard Conformance to the DICOM Storage SOP classes listed in Table 12. Table 13 lists supported Private Storage SOP classes. The corresponding Storage Transfer Syntaxes can be found in Table 18.

Table 12: Supported Storage SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
Stored Print Storage	1.2.840.10008.5.1.1.27	✔	✔
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29	✔	✔
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30	✔	✔
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	✔	✔
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	✔	✔
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	✔	✔
Digital Mammography X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	✔	✔
Digital Mammography X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	✔	✔
Digital Intra-Oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	✔	✔
Digital Intra-Oral X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	✔	✔
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	✔	✔
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	✔	✔
Legacy Converted Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.2	✔	✔
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	✔	✔
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	✔	✔
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	✔	✔
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	✔	✔
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	✔	✔
Enhanced MR Color Image Storage	1.2.840.10008.5.1.4.1.1.4.3	✔	✔
Legacy Converted Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.4	✔	✔
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	✔	✔
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	✔	✔
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	✔	✔
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	✔	✔
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	✔	✔
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	✔	✔
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	✔	✔
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	✔	✔

Table 12: Supported Storage SOP classes...

... Table 12: Supported Storage SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	✔	✔
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	✔	✔
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	✔	✔
Waveform Storage - Trial (Retired)	1.2.840.10008.5.1.4.1.1.9.1	✔	✔
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	✔	✔
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	✔	✔
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	✔	✔
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	✔	✔
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	✔	✔
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	✔	✔
General Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.2	✔	✔
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	✔	✔
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1	✔	✔
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	✔	✔
Standalone VOILUT Storage	1.2.840.10008.5.1.4.1.1.11	✔	✔
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	✔	✔
Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.2	✔	✔
Pseudo-Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.3	✔	✔
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4	✔	✔
XA/XRF Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.5	✔	✔
Grayscale Planar MPR Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.6	✔	✔
Compositing Planar MPR Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.7	✔	✔
Advanced Blending Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.8	✔	✔
Volume Rendering Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.9	✔	✔
Segmented Volume Rendering Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.10	✔	✔
Multiple Volume Rendering Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.11	✔	✔
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	✔	✔
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	✔	✔
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	✔	✔
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	✔	✔
X-Ray Angiographic Bi-Plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3	✔	✔
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	✔	✔
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	✔	✔
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	✔	✔
Breast Projection X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4	✔	✔
Breast Projection X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.13.1.5	✔	✔
Intravascular Optical Coherence Tomography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.14.1	✔	✔
Intravascular Optical Coherence Tomography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.14.2	✔	✔
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	✔	✔
Parametric Map Storage	1.2.840.10008.5.1.4.1.1.30	✔	✔
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	✔	✔
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	✔	✔

Table 12: Supported Storage SOP classes...

... Table 12: Supported Storage SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	✔	✔
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3	✔	✔
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	✔	✔
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	✔	✔
Tractography Results Storage	1.2.840.10008.5.1.4.1.1.66.6	✔	✔
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	✔	✔
Surface Scan Mesh Storage	1.2.840.10008.5.1.4.1.1.68.1	✔	✔
Surface Scan Point Cloud Storage	1.2.840.10008.5.1.4.1.1.68.2	✔	✔
VL Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1	✔	✔
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	✔	✔
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	✔	✔
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	✔	✔
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	✔	✔
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	✔	✔
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	✔	✔
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	✔	✔
Ophthalmic Photography 8 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	✔	✔
Ophthalmic Photography 16 Bit Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	✔	✔
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	✔	✔
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	✔	✔
Wide Field Ophthalmic Photography Stereographic Projection Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.5	✔	✔
Wide Field Ophthalmic Photography 3D Coordinates Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.6	✔	✔
Ophthalmic Optical Coherence Tomography En Face Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.7	✔	✔
Ophthalmic Optical Coherence Tomography B-scan Volume Analysis Storage	1.2.840.10008.5.1.4.1.1.77.1.5.8	✔	✔
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	✔	✔
VL Multi-frame Image Storage - Trial (Retired)	1.2.840.10008.5.1.4.1.1.77.2	✔	✔
Lensometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.1	✔	✔
Autorefraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.2	✔	✔
Keratometry Measurements Storage	1.2.840.10008.5.1.4.1.1.78.3	✔	✔
Subjective Refraction Measurements Storage	1.2.840.10008.5.1.4.1.1.78.4	✔	✔
Visual Acuity Storage Measurements Storage	1.2.840.10008.5.1.4.1.1.78.5	✔	✔
Spectacle Prescription Report Storage	1.2.840.10008.5.1.4.1.1.78.6	✔	✔
Ophthalmic Axial Measurements Storage	1.2.840.10008.5.1.4.1.1.78.7	✔	✔
Intraocular Lens Calculations Storage	1.2.840.10008.5.1.4.1.1.78.8	✔	✔
Macular Grid Thickness and Volume Report	1.2.840.10008.5.1.4.1.1.79.1	✔	✔
Ophthalmic Visual Field Static Perimetry Measurements Storage	1.2.840.10008.5.1.4.1.1.80.1	✔	✔
Ophthalmic Thickness Map Storage	1.2.840.10008.5.1.4.1.1.81.1	✔	✔
Corneal Topography Map Storage	1.2.840.10008.5.1.4.1.1.82.1	✔	✔
Text SR Storage - Trial (Retired)	1.2.840.10008.5.1.4.1.1.88.1	✔	✔
Audio SR Storage - Trial (Retired)	1.2.840.10008.5.1.4.1.1.88.2	✔	✔
Detail SR Storage - Trial (Retired)	1.2.840.10008.5.1.4.1.1.88.3	✔	✔
Comprehensive SR Storage - Trial (Retired)	1.2.840.10008.5.1.4.1.1.88.4	✔	✔

Table 12: Supported Storage SOP classes...

... Table 12: Supported Storage SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11	✔	✔
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22	✔	✔
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33	✔	✔
Comprehensive 3D SR Storage	1.2.840.10008.5.1.4.1.1.88.34	✔	✔
Extensible SR Storage	1.2.840.10008.5.1.4.1.1.88.35	✔	✔
Procedure Log Storage	1.2.840.10008.5.1.4.1.1.88.40	✔	✔
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	✔	✔
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59	✔	✔
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65	✔	✔
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	✔	✔
Radiopharmaceutical Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.68	✔	✔
Colon CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.69	✔	✔
Implantation Plan SR Document Storage	1.2.840.10008.5.1.4.1.1.88.70	✔	✔
Acquisition Context SR Storage	1.2.840.10008.5.1.4.1.1.88.71	✔	✔
Simplified Adult Echo SR Storage	1.2.840.10008.5.1.4.1.1.88.72	✔	✔
Patient Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.73	✔	✔
Planned Imaging Agent Administration SR Storage	1.2.840.10008.5.1.4.1.1.88.74	✔	✔
Performed Imaging Agent Administration SR Storage	1.2.840.10008.5.1.4.1.1.88.75	✔	✔
Content Assessment Results Storage	1.2.840.10008.5.1.4.1.1.90.1	✔	✔
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	✔	✔
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2	✔	✔
Encapsulated STL Storage	1.2.840.10008.5.1.4.1.1.104.3	✔	✔
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	✔	✔
Legacy Converted Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.128.1	✔	✔
PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	✔	✔
Enhanced PET Image Storage	1.2.840.10008.5.1.4.1.1.130	✔	✔
Basic Structured Display Storage	1.2.840.10008.5.1.4.1.1.131	✔	✔
CT Performed Procedure Protocol Storage	1.2.840.10008.5.1.4.1.1.200.2	✔	✔
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	✔	✔
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	✔	✔
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	✔	✔
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	✔	✔
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	✔	✔
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	✔	✔
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	✔	✔
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	✔	✔
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	✔	✔
RT Physician Intent Storage	1.2.840.10008.5.1.4.1.1.481.10	✔	✔
RT Segment Annotation Storage	1.2.840.10008.5.1.4.1.1.481.11	✔	✔
RT Radiation Set Storage	1.2.840.10008.5.1.4.1.1.481.12	✔	✔
C-Arm Photon-Electron Radiation Storage	1.2.840.10008.5.1.4.1.1.481.13	✔	✔
DICOS CT Image Storage	1.2.840.10008.5.1.4.1.1.501.1	✔	✔
DICOS Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.501.2.1	✔	✔

Table 12: Supported Storage SOP classes...

... Table 12: Supported Storage SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
DICOS Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.501.2.2	✔	✔
DICOS Threat Detection Report Storage	1.2.840.10008.5.1.4.1.1.501.3	✔	✔
DICOS 2D AIT Storage	1.2.840.10008.5.1.4.1.1.501.4	✔	✔
DICOS 3D AIT Storage	1.2.840.10008.5.1.4.1.1.501.5	✔	✔
DICOS Quadrupole Resonance Storage	1.2.840.10008.5.1.4.1.1.501.6	✔	✔
Eddy Current Image Storage	1.2.840.10008.5.1.4.1.1.601.1	✔	✔
Eddy Current Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.601.2	✔	✔
RT Beams Delivery Instruction Storage - Trial (Retired)	1.2.840.10008.5.1.4.34.1	✔	✔
RT Beams Delivery Instruction Storage	1.2.840.10008.5.1.4.34.7	✔	✔
RT Brachy Application Setup Delivery Instruction Storage	1.2.840.10008.5.1.4.34.10	✔	✔

Table 13: Supported Private Storage SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
Agfa Basic Attribute Presentation State Storage	1.2.124.113532.3500.7	✔	✔
GE Private 3D Model Storage	1.2.840.113619.4.26	✔	✔
GE Private PET Raw Data Storage	1.2.840.113619.4.30	✔	✔
Siemens CSA Non-Image Storage	1.3.12.2.1107.5.9.1	✔	✔
Siemens CT MR Volume Storage	1.3.12.2.1107.5.99.3.10	✔	✔
Siemens AX Frame Sets Storage	1.3.12.2.1107.5.99.3.11	✔	✔
Philips Private 3D Presentation State Storage	1.3.46.670589.2.5.1.1	✔	✔
Philips Private Perfusion Storage	1.3.46.670589.5.0.13	✔	✔
Philips Private Perfusion Analysis Storage	1.3.46.670589.5.0.14	✔	✔
Philips Private MR Spectrum Storage	1.3.46.670589.11.0.0.12.1	✔	✔
Philips Private MR Series Data Storage	1.3.46.670589.11.0.0.12.2	✔	✔
Philips Private MR Examcard Data Storage	1.3.46.670589.11.0.0.12.4	✔	✔

Table 14: Supported Query/Retrieve SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	✔	✔
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	✔	✔
Patient Root Query/Retrieve Information Model – GET	1.2.840.10008.5.1.4.1.2.1.3	✔	-
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	✔	✔
Study Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	✔	✔
Study Root Query/Retrieve Information Model – GET	1.2.840.10008.5.1.4.1.2.2.3	✔	-
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	✔	-

Table 15: Supported Verification SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
Verification	1.2.840.10008.1.1	✔	-

Table 16: Supported Storage Commitment SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
Storage Commitment Push Model	1.2.840.10008.1.20.1	✔	-

Table 17: Supported Modality Performed Procedure Step SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	✔	✔

For all non C-STORE SOP classes only “Implicit VR Little Endian: Default Transfer Syntax for DICOM” (1.2.840.10008.1.2) is supported.

The following C-STORE SCU/SCP transfer syntaxes are supported:

Table 18: Supported Storage Transfer Syntaxes

Transfer Syntax Name	UID
Implicit VR Little Endian: Default Transfer Syntax for DICOM	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Deflated Explicit VR Little Endian	1.2.840.10008.1.2.1.99
Explicit VR Big Endian	1.2.840.10008.1.2.2
MPEG2 Main Profile / Main Level	1.2.840.10008.1.2.4.100
MPEG2 Main Profile / High Level	1.2.840.10008.1.2.4.101
MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102
MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103
MPEG-4 AVC/H.264 High Profile / Level 4.2 for 2D Image Compression	1.2.840.10008.1.2.4.104
MPEG-4 AVC/H.264 High Profile / Level 4.2 for 3D Image Compression	1.2.840.10008.1.2.4.105
MPEG-4 AVC/H.264 Stereo High Profile / Level 4.2	1.2.840.10008.1.2.4.106
HEVC/H.265 Main Profile / Level 5.1	1.2.840.10008.1.2.4.107
HEVC/H.265 Main 10 Profile / Level 5.1	1.2.840.10008.1.2.4.108
JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8 Bit Image Compression	1.2.840.10008.1.2.4.50
JPEG Extended (Process 2 and 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression (Process 4 only)	1.2.840.10008.1.2.4.51
JPEG Lossless, Non-Hierarchical (Process 14)	1.2.840.10008.1.2.4.57
JPEG Lossless, Non-Hierarchical, First-Order Prediction (Process 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70
JPEG-LS Lossless Image Compression	1.2.840.10008.1.2.4.80
JPEG-LS Lossy (Near-Lossless) Image Compression	1.2.840.10008.1.2.4.81
JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91

Table 18: Supported Storage Transfer Syntaxes...

... Table 18: Supported Storage Transfer Syntaxes

Transfer Syntax Name	UID
JPEG 2000 Part 2 Multi-component Image Compression (Lossless Only)	1.2.840.10008.1.2.4.92
JPEG 2000 Part 2 Multi-component Image Compression	1.2.840.10008.1.2.4.93
RLE Lossless	1.2.840.10008.1.2.5

3.4.2.2 Association Establishment Policies

General

DicomServer AE supports plain TCP and TLS-encrypted communication. For each kind of transport the server provides an arbitrary number of listen ports. All these ports are equivalent and provide the same services.

The maximum PDU size accepted is 16384.

Number of Associations

DicomServer AE starts a thread for each incoming association request. The number of simultaneous associations is thus only limited by the hardware resources. *DicomServer* AE is configured for 30 simultaneous connections per default. This value can be changed without restarting the process.

Asynchronous Nature

DicomServer AE will only allow a single outstanding operation on an association. Therefore, it will not perform asynchronous negotiation.

Implementation Identifying Information

- Implementation Class UID

  1.2.276.0.7230010.3.0.3.6.1

- Implementation Version Name

  OFFIS_DCMTK_361

Extended Negotiation

DicomServer AE supports extended negotiation for `C-FIND` according to DICOM 2013 PS 3.4, C. 5.1.1 for Patient Root Query/ Retrieve and Study Root Query/ Retrieve. The flags "Relational-queries" (Byte 1) and "Date-time matching" (Byte 2) are supported. "Fuzzy semantic matching of person names" (Byte 3) and "Timezone Query Adjustment" (Byte 4) are not supported and therefore always turned down by the SCP during association negotiation.

DicomServer AE supports extended negotiation for `C-MOVE` and C-GET according to DICOM 2013 PS 3.4, C. 5.2.1 and DICOM 2013 PS 3.4, C. 5.3.1 for Patient Root Query/ Retrieve and Study Root Query/ Retrieve. "Relational-retrieval" (Byte 1) is supported.

3.4.2.3 Association Initiation Policy by Real-World Activity

Real-World Activity: `C-MOVE` Request

Associated Real-World Activity

The *DicomServer* AE initiates an association when it receives a `C-MOVE` request.

Proposed Presentation Contexts

DicomServer AE picks all required SOP classes from Table 12 and Table 13 and combines them with all Transfer Syntaxes from Table 18.

Real-World Activity: `C-FIND` Spanning

Associated Real-World Activity

The *DicomServer* AE initiates associations to an arbitrary number of configured targets and forwards the incoming `C-FIND` request unaltered to each of them. The `C-FIND` request is also processed locally. Results that share common identifiers (i.e. share a common 4-tuple Patient ID, Study Instance UID, Series Instance UID and SOP Instance UID) are eliminated. Local results are always returned before any remote results are taken into account.

Proposed Presentation Contexts

The presentation context used for the incoming `C-FIND` request is used for the outgoing association.

Real-World Activity: `C-MOVE` Spanning

Associated Real-World Activity

The *DicomServer* AE receives a `C-MOVE` request and the Called AET used in the incoming association matches the name of a configured DICOM target. In this case the `C-MOVE` request is forwarded unaltered to the corresponding configured targets.

Proposed Presentation Contexts

The presentation context used for the incoming `C-MOVE` request is used for the outgoing association.

3.4.2.4 Association Acceptance Policies

The *DicomServer* AE accepts an association when it receives a valid association request with at least one matching presentation context.

Real-World Activity: Storage SCU

Associated Real-World Activity

The associated real world activity is a modality, workstation, PACS or other system attempting to store an image to the *DicomServer* AE. This results in storage of the received images in *syngo*.share.

Proposed Presentation Contexts

Table 12, 13 and 18 constitute the Presentation Contexts that the *DicomServer* AE accepts from remote DICOM Storage SCUs during a `C-STORE` request.

Presentation Context Acceptance Criterion

The *DicomServer* AE accepts any of the Presentation Contexts that are constituted by the content of the Tables 12, 13 and 18.

KOS - Rejection Notes

On DICOM import KOS Rejection Notes are recognized by *syngo*.share (DicomServer) and lead to the behavior that each SOP Instance that is referenced by this KOS object is soft deleted iteratively from *syngo*.share.

Tag Concept Name Code Sequence in the KOS Rejection Note must contain exactly following information:

- CodingSchemeDesignator = "DCM"
- CodeValue = 113001, 113037, 113038 or 113039
- CodeMeaning = "Rejected for Quality Reasons", "Rejected for Patient Safety Reasons", "Incorrect Modality Worklist Entry" or "Data Retention Policy Expired"

The Current Requested Procedure Evidence Sequence contained in the KOS object may contain 1 to N studies and refers to all SOP Instances which should be soft deleted. It is not possible to delete Study Instance UIDs without having the whole hierarchy down to the Referenced SOP Sequence. The DICOM standard defines this hierarchy in DICOM 2013 PS 3.3 C.17.2.1.

The Referenced SOP Class UID has to comply with the SOP Class UID of the target instance. If referenced objects cannot be found or the SOP Class UIDs do not coincide, the KOS Rejection Note is imported, a warning is logged and no soft deletion of the respective SOP Instances occurs.

It could be enabled that SOP Instance UIDs which were deleted by one of the following reasons: "Rejected for Quality Reasons", "Rejected for Patient Safety Reasons" or "Incorrect Modality Worklist Entry" could not imported (again).

3.4.2.5 Asynchronous DICOM Import

The DICOM import of *syngo*.share VNA usually performs in synchronous mode i.e. the actual import is part of a C-STORE request and a response is sent afterwards. In order to increase the import rate observed by the sending modality, *syngo*.share also offers an advanced asynchronous DICOM import mode, which consists of two steps. To save time, only a few checks are performed on the received data initially, followed by temporarily storing images (i.e. not yet imported into the archive). These images will be added to an import queue (residing in the database). At this point (step 1), the C-STORE request will be finished, meaning that a response with success status will be sent so that the modality knows that *syngo*.share is ready for another request. In a second independent step (step 2), the import queue will be processed and the data will actually be imported into the archive, hence realizing an asynchronous DICOM import. The entries in the import queue are processed in the order of their reception. Their processing will be no different to how synchronous imports are handled. A safeguard is in place to ensure that simultaneous threads do not conflict with one another. Therefore, any actively-processed SOP instance UIDs or SOP instance UIDs referenced by KOS objects will be marked as "in process" and therefore reserved. No other import thread within a DicomServer may simultaneously process the same SOP instance UIDs.

The asynchronous DICOM import might help to more efficiently utilize modalities, because subsequent examinations could be started sooner. This is especially helpful in times of high load. Because the actual import rate is in general less than the externally-observed import rate, this functionality is not meant to be used to import large volumes of data in bulk e.g. a data migration. When the intermediate storage runs low on disk space, the C-STORE requests will be delayed until there is enough free disk space available or until a timeout period has expired. This gradually happens after images have been archived and removed from the intermediate storage. For this intermediate storage, a dedicated hard disk partition is required. Only then can the mechanism prevent an exhaustion of the disk space, which would in turn lead to an error when trying to store an image.

When using both synchronous and asynchronous imports within a system, one might mistakenly assume that successfully sent asynchronously-imported images will be processed before images in a subsequent synchronous import. This may not always be the case due to the inherent delay of asynchronous imports in step 2.

There are several other important points to consider when deciding whether to use synchronous or asynchronous imports in a system.

- Unlike in synchronous imports, the user will not be actively notified of an error during the import, therefore it cannot be dealt with immediately. This is because erroneous images that could exist in step 2 are part of an automated process where no active notification to the user is possible. Therefore, the erroneous images will be added to a DICOM blacklist, which must be manually cleaned by an administrator. This list can be managed by using *DicomAdmin*.

  Note
  Note that the blacklist is not persistent, rather it is kept in memory per DicomServer instance, therefore a restart of the DicomServer will empty the blacklist entries. A new blacklist will be created when the DICOM images are reprocessed. Each DicomServer manages its own blacklist, they are therefore independent of one another.

- Another important point to note is that DICOM storage commitment requests sent by modalities will be given a negative response from *syngo*.share should the request be sent while the images are still pending in step 2. A positive response will only be sent to a modality when the queued data has been archived. Some modalities are not able to send further storage commitment requests after a given period and simply resend images.
- Any queued images in step 2 will not be available to C-FIND and C-MOVE requests, because they have not yet been added to the archive.

For these reasons, the synchronous import mode is preferred over asynchronous import mode when importing a large volume of data or when dealing with modalities with limited capabilities.

3.4.3 EventServer

3.4.3.1 Supported SOP Classes

The *EventServer* AE provides a standard conformant support of the SOP classes mentioned in Table 19.

Table 19: Supported Instance Availability Notification SOP classes

SOP Class Name	SOP Class UID	SCP	SCU
Instance Availability Notification	1.2.840.10008.5.1.4.33	-	✔

3.4.3.2 Association Establishment Policies

General

EventServer AE supports TCP/IP. If a DICOM IAN has to be send it will attempt to establish an association with a remote AE. The host, port and remote application entity title are defined within the configuration dialog.

Number of Associations

EventServer AE starts a thread for each configured receiving AE (note that it is possible that an AE is configured twice). The number of simultaneous associations is thus only limited by the hardware resources.

Asynchronous Nature

EventServer AE will only allow a single outstanding operation on each association. Therefore it will not perform asynchronous negotiation.

Implementation Identifying Information

- Implementation Class UID

  1.2.276.0.7230010.3.0.3.6.1

- Implementation Version Name

  OFFIS_DCMTK_361

Association Initiation Policy by Real-World Activity

EventServer AE initiates an association with a remote AE for N-CREATE requests. As a default the DICOM Implicit VR Little Endian Transfer Syntax (1.2.840.10008.1.2) as defined in DICOM 2013 PS 3.5, 10.1 is used.

4 DICOM Media AE Specification

This chapter describes the DICOM Media functionalities of the *syngo*.share view, *syngo*.share import, and *webadmin* AEs.

4.1 Implementation Model

4.1.1 Application Data Flow Diagram

See Section 2.1.1 (*syngo*.share view Data Flow Diagram), Section 2.1.2 (*syngo*.share import Data Flow Diagram) and Section 2.1.3 (*webadmin* Data Flow Diagram).

4.1.2 Functional Definitions of AEs

The *syngo*.share view- and *syngo*.share import AEs implement standard DICOM conformant Service Classes for creating and reading DICOM file sets (according to DICOM 2013 PS 3.10). At least General Purpose CD-R Interchange Profiles are supported.

The *webadmin* AE implements a standard DICOM conformant Service class for retrieving DICOM images over Web Access to DICOM Objects by URI (WADO-URI).

4.1.3 Sequencing of Real World Activities

The DICOM Media functionalities of the *syngo*.share view- and *syngo*.share import AEs can be used at any time through their user interfaces.

Also the *webadmin* AE can be used at any time by the user or the application that performs the WADO-URI request.

4.1.4 File Meta Information

- Implementation Class UID

  1.2.276.0.7230010.3.0.3.6.1

- Implementation Version Name

  OFFIS_DCMTK_361

4.2 Application Entity Specification

4.2.1 view

See Section 3.1 for supported SOP classes for import and export of media.

Table 20: *syngo*.share view AE Related Application Profiles, Real-world Activity Roles, and Roles for Interchanging

Application Profiles Supported	Real World Activity	Role	SC Option
syngo.share view-FSR	Read DICOM file set	FSR	Interchange

Table 20: syngo.share view AE Related Application Profiles, Real-world Activity Roles, and Roles for Interchanging...

... *Table 20: syngo.share view AE Related Application Profiles, Real-world Activity Roles, and Roles for Interchanging*

Application Profiles Supported	Real World Activity	Role	SC Option
syngo.share view-FSC	Export DICOM file set	FSC	Interchange

4.2.1.1 Real World Activities

Import Media

The complete file set is read for displaying purposes.

Reading DICOMDIR keys

All mandatory DICOMDIR keys are required in order to structure the images within the file sets appropriately.

Creating DICOMDIRs

view creates DICOMDIR with all mandatory keys as defined in DICOM 2013 PS 3.10.

Export Media

syngo.share view is able to organize DICOM images, series and studies into a single-patient file set which will then be written on portable media (e.g. CDs or DVDs). The view, here acting as a FSC, uses the following Transfer Syntaxes:

Table 21: Supported *syngo*.share view Export Transfer Syntaxes

Transfer Syntax Name	Transfer Syntax UID
Explicit VR Little Endian	1.2.840.10008.1.2.1

4.2.2 *syngo*.share import

See Section 3.3 for supported SOP classes for import of media.

Table 22: *syngo*.share import AE Related Application Profiles, Real-world Activity Roles, and Roles for Interchanging

Application Profiles Supported	Real World Activity	Role	SC Option
syngo.share import-FSR	Read DICOM file set	FSR	Interchange

4.2.2.1 Real World Activities

Import Media

The user can choose whether a complete file set or just parts of it are read for import.

Reading DICOMDIR keys

All mandatory DICOMDIR keys are required in order to structure the images within the file sets appropriately.

4.2.3 webadmin

Table 23: WADO-URI AE Related Application Profiles, Real-world Activity Roles, and Roles for Interchanging

Application Profiles Supported	Real World Activity	Role	SC Option
webadmin AE	WADO-URI Request	FSR	Interchange

4.2.3.1 Real World Activities

WADO-URI request

The user of the application that performs the WADO-URI request can retrieve any DICOM image that exists in *syngo*.share, by identifying it with its DICOM study, series and image id's. See DICOM 2013 PS 3.18 for more information.

4.3 Augmented and Private Application Profiles

Not used.

5 Communication Profiles

5.1 Supported Communication Stacks

DicomServer and *EventServer* provide plain TCP (see DICOM 2013 PS 3.8, 9) and TLS-encrypted communication (see DICOM 2013 PS 3.15, B.1). They uses OFFIS DICOM Tool Kit (DCMTK) for their communication which itself relies on the operating system it runs on.

6 Security Profiles

6.1 Audit Trail Message Format Profile

To help assure healthcare privacy and security in automated systems, usage data need to be collected. These data will be reviewed by administrative staff to verify that healthcare data is being used in accordance with the healthcare provider's data security requirements and to establish accountability for data use. This data collection and review process is called auditing and the data itself comprises the audit trail. Audit trails can be used for surveillance purposes to detect when interesting events might happened that warrant further investigation.

Auditing in *syngo*.share is implemented according to the IHE profile Audit Trail and Node Authentication (part Audit Trail) which is based on DICOM 2020a PS 3.15, A. 5. Auditing is restricted to events regarding patients, documents, user authentications, hard-deletion configurations, and audit configuration:

- search for patients or documents
- creation, modification, or deletion of patients
- import, modification, deletion, export, or sharing of documents
- changing states of documents (document workflow state) or parts thereof (DICOM series thin slice state)
- changing of information associated with documents (document logs) or parts thereof (generic file coupling)
- login or logout of users
- modification of hard-deletion configurations
- modification of the audit configuration

Some events can be audited by third-party clients via interface methods provided by the *EventServer*:

- starting or stopping of applications
- login or logout of users
- creation, access, update or deletion of DICOM studies
- security alerts

The processing of audit messages works asynchronously — events are recorded immediately, however, the resulting audit messages are queued and sent to an Audit Record Repository via TCP in periodic time intervals (the frequency of the intervals is configurable). If required, audit messages can be analyzed with an Audit Record Viewer. To use audit messages for effective system analyses, it is necessary that each audit message can be uniquely associated with a certain event. To this end each audit message provides various information. The most import ones are

- the event ID,
- the date and time of the event,
- the status of the event,
- user IDs,
- application IDs,
- object IDs,

- audit trail ID (used to aggregate audit messages in order to reconstruct audit trails)
- audit source ID.

Within *syngo*.share the events recorded by audit messages are primarily identified via event IDs. However, since most event IDs represent a group of events rather than a single event it is often necessary to explore audit messages in detail to identify the reported events. In the following the event IDs used by *syngo*.share as well as some short instructions on how to identify events are given:

- `110100` (Application Activity): This audit message describes the event of an Application Entity starting or stopping.
- `110102` (Begin Transferring DICOM Instances): This event ID is used to indicate the begin of an internal or external transfer of DICOM Images. To differ between the two transfer types, one has to analyze the participating destination application. If the destination application represents a *syngo*.share module, then an internal transfer has been performed. If it specifies a third-party system, an external transfer has been occurred.
- `110103` (DICOM Instances Accessed): This event ID is used in audit messages which are generated if DICOM Images are accessed, updated, moved, created or undeleted. It is also used if parts of a DICOM Study are deleted (if a complete DICOM Study is deleted, the event ID `110105` (DICOM Study Deleted) is used instead). To differ between the mentioned operations one has to analyze the event action code ID as well as the objects stated in the audit message. If the event action code ID specifies an `R`, DICOM Images have been accessed. If the event action code ID defines an `U`, DICOM Images have been updated or moved (the life cycle of the DICOM Images indicates which of the two operations has been executed). If the event action code ID specifies a `C`, DICOM Images have been created (externally) or undeleted (internally). Finally, if the event action code ID states a `D`, DICOM images of a DICOM Study have been deleted.
- `110104` (DICOM Instances Transferred): The event ID `110104` is used to audit the end of an internal or external transfer of DICOM Images. In case of an internal transfer the source application represents a *syngo*.share module. If the source application defines a third-party system, the end of an external transfer has been audited.
- `110105` (DICOM Study Deleted): This event ID indicates the deletion of all DICOM Images of a DICOM Study. The life cycle information of the DICOM Study indicate whether the DICOM Study has been soft-deleted or hard-deleted.
- `110106` (Export): This event ID specifies the export of DICOM Images or generic files to a media. Detailed information about the exported DICOM Images or generic files can be obtained by analyzing the listed objects.
- `110107` (Import): Audit messages stating the event ID `110107` audit the import of DICOM Images or generic files from a media or the copy of DICOM Images or generic files. To obtain detailed information about the imported DICOM Images or generic files, the objects specified by the audit message should be analyzed.
- `110110` (Patient Record): Whenever the event ID `110110` appears in an audit messages, it indicates the creation, update, merge, deletion, or undeletion of a patient. To distinguish between the different cases one has to analyze the event action code ID as well as the objects stated in the audit message. If the event action code ID specifies a `C`, a patient has been either created or undeleted. If the event action code ID states a `U` a patient has been updated or merged. Finally, if the event action code ID defines a `D`, a patient has been deleted. Two distinguish between the creation and undeletion of a patient as well as the update and merge of a patient one has to evaluate the life cycle information of the listed patients.
- `110112` (Query): This event ID indicates that either a DICOM `C-FIND` request or a SQL query has

been performed. To differ between the two kinds of queries, one has to check if the object representing the query states a DICOM `C-FIND` request or a SQL query.

- `110113` (Security Alert): We have to differentiate between an internal and an external use case:
  - Internal use case: Audit messages stating the event ID `110113` describe the creation, update, or deletion of a system configuration (e.g., audit configuration, hard-deletion configuration, etc.), which is denoted by the event type code `110131` (Software Configuration). To decide which operation has been performed, the life cycle of the system configuration object has to be analyzed. Note that manipulations of the audit configuration are of peculiar interest because the audit configuration determines which events are audited; in this case one of the event type codes `110133` (Audit Recording Stopped) or `110134` (Audit Recording Started) is specified additionally.
  - External use case: This event ID indicates that a security alert was reported. The event type code indicates the underlying event. Currently the following security alert type codes (CID 403) are supported: `110132` (Use of Restricted Function), `110136` (Security Roles Changed), and `110137` (User Security Attributes Changed).
- `110114` (User Authentication): This event ID is used to audit a login or logout. To differ between the two kinds of authentication, the event type codes have to be evaluated.
- `EI-001` (Begin Transferring Generic Instances): Via this event ID, the begin of an internal or external transfer of generic files is recorded. To analyze the kind of transfer type, a similar reasoning as for DICOM Images should be applied (see event ID `110102`).
- `EI-002` (Generic Instances Transferred): This event ID indicates the end of an internal or external transfer of generic files. Similar as in case of event ID `110104` one has to analyze the source application (*syngo*.share module versus third-party system) to obtain the exact kind of transfer.
- `EI-003` (Generic Instances Accessed): The event ID `EI-003` is used if generic files are accessed, updated, moved, or undeleted. It is also used if parts of a generic container are deleted (if a complete generic container is deleted, the event ID `EI-004` (Generic Container Deleted) is used instead). To decide which operation has been performed, a similar reasoning as in case of DICOM Images should be applied (see event ID `110103`).
- `EI-004` (Generic Container Deleted): This event ID indicates the deletion of all generic files of a generic container. The life cycle information of the generic container indicate whether the generic container has been soft-deleted or hard-deleted.
- `EI-005` (DICOM Study Share): This event ID is specified by audit messages which audit the creation or deletion of DICOM Study shares. To differ between the two cases the event action code ID of the audit message has to be analyzed. If the event action code ID states a `C`, DICOM Studies have been shared. If it specifies a `D` existing DICOM Study shares have been deleted.
- `EI-006` (Generic Container Share): The event ID `EI-006` indicates the creation or deletion of generic container shares. To decide which operation has been performed, a similar reasoning as in case of DICOM Study shares should be applied (see event ID `EI-005`).
- `EI-007` (DICOM Import Queue Entries Deleted): This event ID indicates the deletion of entries in the DICOM import queue used for the asynchronous DICOM import.
- `EI-008` (Document Workflow State Changed) This event ID is used to audit the change of the workflow state of a document (i.e. DICOM study or generic container). The audit message contains information about the user, patient, and the document, including the description of the old and new workflow state.
- `EI-009` (DICOM Series Thin Slice State Changed) This event ID indicates the change of the thin slice state of a DICOM series. The audit message contains information about the user, patient, and

the document, including the old and new thin slice state.

- `EI-010` (Document Logs Deleted) This event ID is used to audit the deletion of document logs. The audit message contains information about the user, patient, and the document. The latter includes the number of deleted document logs as well as the deletion type, stating whether individual or all logs were deleted.
- `EI-011` (Generic File Coupling Changed) This event ID indicates the change of generic file couplings, whereby one such message is created per file. The audit message contains information about the user, patient, and the document (generic container). The coupling information is included in the latter and is comprised of the generic file UID, and per old and new coupling the coupling group, coupling type, as well as the corresponding identifier.

To ensure that information provided by audit messages can be used to reconstruct and understand audited events, audit messages of various event IDs are equipped with different detailed information:

- `110102` (Begin Transferring DICOM Instances): Audit messages with this event ID are additionally equipped with the Series Instance UIDs (SOP Instance UIDs) of the affected DICOM Series (DICOM Images). Note that if neither Series Instance UIDs nor SOP Instance UIDs are specified, the whole DICOM Study has been involved in the occurred event.
- `110103` (DICOM Instances Accessed): Similarly to audit messages with event ID `110102`, the Series Instance UIDs (SOP Instance UIDs) of the affected DICOM Series (DICOM Images) are specified (if neither Series Instance UIDs nor SOP Instance UIDs are specified, the whole DICOM Study has been affected). In addition, if DICOM Images are updated, detailed information about the changed values are provided.
- `110104` (DICOM Instances Transferred): See event ID `110102`.
- `110106` (Export): Audit messages with this event ID specify additionally the Series Instance UIDs (SOP Instance UIDs, generic file UIDs) of the affected DICOM Series (DICOM Images, generic files).
- `110107` (Import): See event ID `110106`.
- `110110` (Patient Record): If a patient has been updated, audit message with event ID `110110` are equipped with detailed information about the changed values.
- `110112` (Query): If an audit message with event ID `110112` records the execution of a `C-FIND` request, the transfer syntax of the `C-FIND` request is stated.
- `110113` (Security Alert): We have to differentiate between an internal and an external use case:
  - Internal use case: If a system configuration has been updated, audit messages with this event ID specify detailed information about the changed values. Additionally, an alert description is included independently whether a system configuration has been created, updated, or deleted.
  - External use case: Further information about the underlying event is potentially provided by the alert subjects.
- `EI-001` (Begin Transferring Generic Instances): An audit message with this event ID additionally states the generic file UIDs of the affected generic files. Note that if no generic file UIDs are listed, the whole generic container has been involved in the event.
- `EI-002` (Generic Instances Transferred): See event ID `EI-001`.
- `EI-003` (Generic Instances Accessed): Similarly to audit messages with event ID `EI-001`, the generic file UIDs of the affected generic files are specified (if no generic file UIDs are specified, the whole generic container has been affected). In addition, if generic files are updated, detailed information about the changed values are provided.

To simplify the analysis of audit messages generated by *syngo*.share, audit messages are organized in so-called audit trails. An audit trail represents a group of audit messages which have been created during the execution of a certain event (e.g. access of a DICOM Study, deletion of DICOM Images, transmission of generic files, etc.).

Audit trail messages are categorized into main and sub audit messages since an audit event may entail several sub-events. For example, the correction of patient data may require, among other things, searching for the patients whose data has to be corrected. In this example, the correction of patient data is the main audit event (thus generating a main audit message), while searching for patients is a sub-event (thus generating a sub audit message).

Each audit trail is assigned a unique audit trail ID to distinguish it from others.

Auditing must be configured in *webadmin*. The most important configuration options are `AuditSystemActions` and `AuditUserActions`. The first one enables the auditing of actions triggered by systems or unknown users whereas the latter one ensures that actions triggered by registered users are audited. Since (automatic) events triggered by third-party systems are of minor interest but can lead to a tremendous amount of audit messages, it is recommended to enable the configuration key `AuditUserActions` but disable the configuration key `AuditSystemActions`.

For general information about auditing, please consult the *syngo*.share System Documentation.

7 Configuration

syngo.share view and *syngo*.share import provide user interfaces in order to facilitate configuration. *DicomServer* and *EventServer* is configured according to the standard *syngo*.share server configuration mechanism which can be found in *syngo*.share System Documentation.

8 Country-specific Requirements

syngo.share can meet the legal requirements of a given country, and can do this in compliance with the IHE Technical Framework. *syngo*.share applies country-specific changes to DICOM communication at the tenant level i.e. according to the country set in the tenant settings. The following chapter describes how *syngo*.share handles specific countries.

8.1 France

French Law mandates special requirements for medical communication. See the IHE Technical Framework National Extensions chapter for details. To fulfil these requirements, *syngo*.share VNA can automatically modify DICOM elements. Care has been taken to ensure that these implicit modifications will be applied at the correct point in the chain of events to ensure that forbidden data is never archived or transmitted.

When processing C-STORE requests, the following DICOM Element values will be emptied automatically:

- EthnicGroup `(0010,2160)`
- PatientReligiousPreference `(0010,21F0)`

9 Support of Extended Character Sets

9.1 Supported Character Sets

Table 24 contains the character sets which are supported with and without code extension techniques. If the given specific character set does not correspond to the characters in an IOD or the specific character set is invalid, the DICOM dataset will not be processed. In these cases a configuration can be used to correct the character set. Due to practical reasons the Specific Character Set is used instead of the Default Character Repertoire to process tags with VR CS.

Table 24: Supported Character Sets

MIME Name	Without Code Extensions	With Code Extensions
US-ASCII	ISO_IR 6	ISO 2022 IR 6
ISO-8859-1	ISO_IR 100	ISO 2022 IR 100
ISO-8859-2	ISO_IR 101	ISO 2022 IR 101
ISO-8859-3	ISO_IR 109	ISO 2022 IR 109
ISO-8859-4	ISO_IR 110	ISO 2022 IR 110
ISO-8859-5	ISO_IR 144	ISO 2022 IR 144
ISO-8859-6	ISO_IR 127	ISO 2022 IR 127
ISO-8859-7	ISO_IR 126	ISO 2022 IR 126
ISO-8859-8	ISO_IR 138	ISO 2022 IR 138
ISO-8859-9	ISO_IR 148	ISO 2022 IR 148
JIS_X0201	ISO_IR 13	ISO 2022 IR 13
TIS-620	ISO_IR 166	ISO 2022 IR 166
JIS_X0208-1990	-	ISO 2022 IR 87
JIS_X0212-1990	-	ISO 2022 IR 159
KS_X_1001-1997	-	ISO 2022 IR 149
GB2312	-	ISO 2022 IR 58
UTF-8	ISO_IR 192	-
GB18030	GB18030	-
GBK	GBK	-

9.2 Configuration Capabilities

The specific character set of a C-STORE request can be corrected with a configuration. Furthermore the specific character set of the C-FIND request and response can be configured. For example the specific character set configuration values could be set to 'ISO_IR 192', 'ISO_IR 100', 'ISO 2022 IR 100\ISO 2022 IR 87' etc.

9.3 Query Capabilities

During the processing of the C-FIND query attributes the specific character set of the request is considered. By default the response is encoded in ISO_IR 192 (UTF-8). If an alternate specific character set is configured for a C-FIND response, all characters which are not part of the given character set are exchanged by the replacement character '?'. If the query contains the attribute PatientName, only the al-

phabetic component group is used for search. In the response, attributes with the value representation PN contain all component groups (alphabetic, ideographic and phonetic).

A DICOM Element List for Query/Retrieve-Service Classes

In the following, the DICOM keys which are used for matching on Patient, Study, Series and Image level in `C-FIND` requests are listed. All keys are supported for matching and response. Person Name fields are always matched case-insensitive. The attribute Specific Character Set (0008,0005) shall be included if expanded or replacement character sets may be used in any of the Attributes in the Request Identifier.

A.1 Supported `C-FIND` Element Requests on Patient Level

Table 25: Supported C-FIND Elements on Patient Level

Keyword	Tag	Remark
PatientID	(0010,0020)	
PatientName	(0010,0010)	
PatientBirthDate	(0010,0030)	Combined Date/Time Matching supported
PatientBirthTime	(0010,0032)	Combined Date/Time Matching supported
PatientSex	(0010,0040)	
PatientBirthName	(0010,1005)	
OtherPatientIDs	(0010,1000)	

A.2 Supported `C-FIND` Element Requests on Study Level

In case of Study Root Query/Retrieve, where no Patient level exists, all mentioned Patient level keys are supported on level Study.

Table 26: Supported C-FIND Elements on Study Level

Keyword	Tag	Remark
StudyInstanceUID	(0020,000D)	
StudyDate	(0008,0020)	Combined Date/Time Matching supported
StudyTime	(0008,0030)	Combined Date/Time Matching supported
StudyDescription	(0008,1030)	
AccessionNumber	(0008,0050)	
StudyID	(0020,0010)	
NumberOfStudyRelatedSeries	(0020,1206)	
NumberOfStudyRelatedInstances	(0020,1208)	
ReferringPhysicianName	(0008,0090)	
ModalitiesInStudy	(0008,0061)	Multiple values are supported and combined using a logical OR.

A.3 Supported C-FIND Element Requests on Series Level

Table 27: Supported C-FIND Elements on Series Level

Keyword	Tag	Remark
SeriesInstanceUID	(0020,000E)	
Modality	(0008,0060)	
SeriesNumber	(0020,0011)	
SeriesDescription	(0008,103E)	
NumberOfSeriesRelatedInstances	(0020,1209)	
InstitutionName	(0008,0080)	
InstitutionalDepartmentName	(0008,1040)	
StationName	(0008,1010)	
PerformingPhysicianName	(0008,1050)	
Manufacturer	(0008,0070)	
ManufacturerModelName	(0008,1090)	
BodyPartExamined	(0018,0015)	
OperatorsName	(0008,1070)	
PerformedProcedureStepStartDate	(0040,0244)	Combined Date/Time Matching supported
PerformedProcedureStepStartTime	(0040,0245)	Combined Date/Time Matching supported
PerformedProcedureStepEndDate	(0040,0250)	Combined Date/Time Matching supported
PerformedProcedureStepEndTime	(0040,0251)	Combined Date/Time Matching supported
SeriesDate	(0008,0021)	Combined Date/Time Matching supported
SeriesTime	(0008,0031)	Combined Date/Time Matching supported
RequestAttributesSequence/ RequestedProcedureID	(0040,0275)/ (0040,1001)	
RequestAttributesSequence/ ScheduledProcedureStepID	(0040,0275)/ (0040,0009)	

A.4 Supported C-FIND Element Requests on Image Level

Table 28: Supported C-FIND Elements on Image Level

Keyword	Tag	Remark
SOPInstanceUID	(0008,0018)	
InstanceNumber	(0020,0013)	
SOPClassUID	(0008,0016)	
Rows	(0028,0010)	
Columns	(0028,0011)	
BitsAllocated	(0028,0100)	
BitsStored	(0028,0101)	

Table 28: Supported C-FIND Elements on Image Level...

... Table 28: Supported C-FIND Elements on Image Level

Keyword	Tag	Remark
SamplesPerPixel	(0028,0002)	
NumberOfFrames	(0028,0008)	
ContentTemplateSequence/ TemplateIdentifier	(0040,A504)/ (0040,DB00)	Needs SOP Class from Table 29
ContentTemplateSequence/ MappingResource	(0040,A504)/ (0008,0105)	Needs SOP Class from Table 29
ContentDate	(0008,0023)	Needs SOP Class from Table 29
ContentTime	(0008,0033)	Needs SOP Class from Table 29
ObservationDateTime	(0040,A032)	Needs SOP Class from Table 29
ReferencedRequestSequence/ StudyInstanceUID	(0040,A370)/ (0020,000D)	Needs SOP Class from Table 29
ReferencedRequestSequence/ AccessionNumber	(0040,A370)/ (0008,0050)	Needs SOP Class from Table 29
ReferencedRequestSequence/ RequestedProcedureID	(0040,A370)/ (0040,1001)	Needs SOP Class from Table 29
ReferencedRequestSequence/ RequestedProcedureCodeSequence/ CodeValue	(0040,A370)/ (0032,1064)/ (0008,0100)	Needs SOP Class from Table 29
ReferencedRequestSequence/ RequestedProcedureCodeSequence/ CodingSchemeDesignator	(0040,A370)/ (0032,1064)/ (0008,0102)	Needs SOP Class from Table 29
ReferencedRequestSequence/ RequestedProcedureCodeSequence/ CodingSchemeVersion	(0040,A370)/ (0032,1064)/ (0008,0103)	Needs SOP Class from Table 29
ReferencedRequestSequence/ RequestedProcedureCodeSequence/ CodeMeaning	(0040,A370)/ (0032,1064)/ (0008,0104)	Needs SOP Class from Table 29
ConceptNameCodeSequence/ CodeValue	(0040,A043)/ (0008,0100)	Needs SOP Class from Table 29
ConceptNameCodeSequence/ CodingSchemeDesignator	(0040,A043)/ (0008,0102)	Needs SOP Class from Table 29
ConceptNameCodeSequence/ CodingSchemeVersion	(0040,A043)/ (0008,0103)	Needs SOP Class from Table 29
ConceptNameCodeSequence/ CodeMeaning	(0040,A043)/ (0008,0104)	Needs SOP Class from Table 29
CompletionFlag	(0040,A491)	Needs SOP Class from Table 29
VerificationFlag	(0040,A493)	Needs SOP Class from Table 29
VerifyingObserverSequence/ VerifyingOrganization	(0040,A073)/ (0040,A027)	Needs SOP Class from Table 29
VerifyingObserverSequence/ VerificationDateTime	(0040,A073)/ (0040,A030)	Needs SOP Class from Table 29
VerifyingObserverSequence/ VerifyingObserverName	(0040,A073)/ (0040,A075)	Needs SOP Class from Table 29
VerifyingObserverSequence/ VerifyingObserverIdentificationCodeSequ CodeValue	(0040,A073)/ (0040,A088)/ (0008,0100)	Needs SOP Class from Table 29

Table 28: Supported C-FIND Elements on Image Level...

... Table 28: Supported C-FIND Elements on Image Level

Keyword	Tag	Remark
VerifyingObserverSequence/ VerifyingObserverIdentificationCodeSequ CodingSchemeDesignator	(0040,A073)/ (0040,A088)/ (0008,0102)	Needs SOP Class from Table 29
VerifyingObserverSequence/ VerifyingObserverIdentificationCodeSequ CodingSchemeVersion	(0040,A073)/ (0040,A088)/ (0008,0103)	Needs SOP Class from Table 29
VerifyingObserverSequence/ VerifyingObserverIdentificationCodeSequ CodeMeaning	(0040,A073)/ (0040,A088)/ (0008,0104)	Needs SOP Class from Table 29
ContentLabel	(0070,0080)	Needs SOP Class from Table 29
ContentDescription	(0070,0081)	Needs SOP Class from Table 29
PresentationCreationDate	(0070,0082)	Needs SOP Class from Table 29
PresentationCreationTime	(0070,0083)	Needs SOP Class from Table 29
ContentCreatorName	(0070,0084)	Needs SOP Class from Table 29
ReferencedSeriesSequence/ SeriesInstanceUID	(0008,1115)/ (0020,000E)	Needs SOP Class from Table 29
ReferencedSeriesSequence/ ReferencedImageSequence/ ReferencedSOPClassUID	(0008,1115)/ (0008,1140)/ (0008,1150)	Needs SOP Class from Table 29
ReferencedSeriesSequence/ ReferencedImageSequence/ ReferencedSOPInstanceUID	(0008,1115)/ (0008,1140)/ (0008,1155)	Needs SOP Class from Table 29

Table 29: SOP Classes that Support Additional Query Elements

SOP Class Name	SOP Class UID
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.2
Pseudo-Color Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.3
Blending Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.4
XA/XRF Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.5
Grayscale Planar MPR Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.6
Compositing Planar MPR Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.7
Advanced Blending Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.8
Volume Rendering Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.9
Segmented Volume Rendering Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.10
Multiple Volume Rendering Volumetric Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.11
Text SR Storage - Trial (Retired)	1.2.840.10008.5.1.4.1.1.88.1
Audio SR Storage - Trial (Retired)	1.2.840.10008.5.1.4.1.1.88.2
Detail SR Storage - Trial (Retired)	1.2.840.10008.5.1.4.1.1.88.3
Comprehensive SR Storage - Trial (Retired)	1.2.840.10008.5.1.4.1.1.88.4
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive SR Storage	1.2.840.10008.5.1.4.1.1.88.33
Comprehensive 3D SR Storage	1.2.840.10008.5.1.4.1.1.88.34

Table 29: SOP Classes that Support Additional Query Elements...

... Table 29: SOP Classes that Support Additional Query Elements

SOP Class Name	SOP Class UID
Extensible SR Storage	1.2.840.10008.5.1.4.1.1.88.35
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50
Key Object Selection Document Storage	1.2.840.10008.5.1.4.1.1.88.59
Chest CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.65
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67
Radiopharmaceutical Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.68
Colon CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.69
Implantation Plan SR Document Storage	1.2.840.10008.5.1.4.1.1.88.70
Acquisition Context SR Storage	1.2.840.10008.5.1.4.1.1.88.71
Simplified Adult Echo SR Storage	1.2.840.10008.5.1.4.1.1.88.72
Patient Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.73
Planned Imaging Agent Administration SR Storage	1.2.840.10008.5.1.4.1.1.88.74
Performed Imaging Agent Administration SR Storage	1.2.840.10008.5.1.4.1.1.88.75

A.5 Supported C-FIND Element Requests Issued by *syngo*.share view on Study Level

Table 30: Supported C-FIND Element Requests Issued by *syngo*.share view on Study Level

Keyword	Tag	Remark
PatientID	(0010,0020)	
PatientName	(0010,0010)	
PatientBirthDate	(0010,0030)	
PatientSex	(0010,0040)	
PatientBirthName	(0010,1005)	
StudyDate	(0008,0020)	
StudyDescription	(0008,1030)	
AccessionNumber	(0008,0050)	
ModalitiesInStudy	(0008,0061)	
StudyInstanceUID	(0020,000d)	
NumberOfStudyRelatedSeries	(0020,1206)	
NumberOfStudyRelatedInstances	(0020,1208)	

B List of Elements for Modality Worklist C-FIND Requests

Modality Worklist queries support all C-FIND elements from the Patient Level. The attribute Specific Character Set (0008,0005) will be included if expanded or replacement character sets may be used in any of the Attributes in the Request Identifier.

Table 31: Supported C-FIND Modality Worklist Keywords

Key	Tag	Remark
AdmissionID	(0038,0010)	
AdmittingDate	(0038,0020)	Combined Date/Time Matching supported
AdmittingTime	(0038,0021)	Combined Date/Time Matching supported
CurrentPatientLocation	(0038,0300)	
ConfidentialityConstraintOnPatientDataD	(0040,3001)	
PregnancyStatus	(0010,21C0)	
ReferringPhysicianName	(0008,0090)	
ScheduledProcedureStepSequence/ ScheduledStationAETitle	(0040,0100)/ (0040,0001)	
ScheduledProcedureStepSequence/ ScheduledProcedureStepStartDate	(0040,0100)/ (0040,0002)	Combined Date/Time Matching supported
ScheduledProcedureStepSequence/ ScheduledProcedureStepStartTime	(0040,0100)/ (0040,0003)	Combined Date/Time Matching supported
ScheduledProcedureStepSequence/ Modality	(0040,0100)/ (0008,0060)	
ScheduledProcedureStepSequence/ ScheduledPerformingPhysicianName	(0040,0100)/ (0040,0006)	
ScheduledProcedureStepSequence/ ScheduledProcedureStepDescription	(0040,0100)/ (0040,0007)	no matching, response only
ScheduledProcedureStepSequence/ ScheduledProcedureStepID	(0040,0100)/ (0040,0009)	
ScheduledProcedureStepSequence/ ScheduledProtocolCodeSequence/ CodeValue	(0040,0100)/ (0040,0008)/ (0008,0100)	no matching, response only
ScheduledProcedureStepSequence/ ScheduledProtocolCodeSequence/ CodingSchemeDesignator	(0040,0100)/ (0040,0008)/ (0008,0102)	no matching, response only
ScheduledProcedureStepSequence/ ScheduledProtocolCodeSequence/ CodeMeaning	(0040,0100)/ (0040,0008)/ (0008,0104)	no matching, response only
ScheduledProcedureStepSequence/ RequestedProcedureCodeSequence/ CodeValue	(0040,0100)/ (0032,1064)/ (0008,0100)	no matching, response only
ScheduledProcedureStepSequence/ RequestedProcedureCodeSequence/ CodingSchemeDesignator	(0040,0100)/ (0032,1064)/ (0008,0102)	no matching, response only

Table 31: Supported C-FIND Modality Worklist Keywords...

... *Table 31: Supported C-FIND Modality Worklist Keywords*

Key	Tag	Remark
ScheduledProcedureStepSequence/ RequestedProcedureCodeSequence/ CodeMeaning	(0040,0100)/ (0032,1064)/ (0008,0104)	no matching, response only
RequestedProcedureID	(0040,1001)	
RequestedProcedureDescription	(0032,1060)	no matching, response only
StudyInstanceUID	(0020,000D)	
AccessionNumber	(0008,0050)	
RequestingPhysician	(0032,1032)	
OrderCallbackPhoneNumber	(0040,2010)	
PlacerOrderNumberImagingServiceReque	(0040,2016)	
FillerOrderNumberImagingServiceReques	(0040,2017)	
OrderEntererLocation	(0040,2009)	
PatientState	(0038,0500)	
MedicalAlerts	(0010,2000)	

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