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syngo® Imaging – *syngo*® Studio Workplace V35A

DICOM Conformance Statement

Rev. 3.0 2008-08-26

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Conformance Statement Overview

There are three different deployments of workplaces available:

- *syngo*® Studio Advanced
- *syngo*® Studio
- web-based *syngo*® Studio

The table below depicts the different DICOM capabilities of the different deployments:

Workplace Deployment	DICOM Service	Role
syngo® Studio Advanced	Query	SCU
	Print	SCU
syngo® Studio	Query	SCU
web-based *syngo*® Studio[1]	Query	SCU

Table 1: overview about supported DICOM services and roles

Summarizing, all *syngo*® Studio Workplace deployments include the

- Query AE

the *syngo*® Studio Advanced Workplace additionally incorporates the

- Print AE.

[1] Restriction: DICOM query is only supported in case web-based *syngo*® Studio Workplace is deployed over LAN.

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1 Introduction

1.1 General

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

1.2 Audience

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

1.3 Remarks

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

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

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

The user should be aware of the following important issues:

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

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

1.4 Definitions, Terms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

Additional Abbreviations and terms are as follows:

ACR	American College of Radiology
AE	DICOM Application Entity
ASCII	American Standard Code for Information Interchange
C-Find	The C-FIND operation is the mechanism by which queries are performed. Matches against the keys present in the Identifier are returned in C-FIND responses.
DB	Database
DCS	DICOM Conformance Statement
DIMSE	DICOM Message Service Element
DSA	Digital Subtraction Angiography
FSC	File Set Creator
FSR	File Set Reader
FSU	File Set User
GYN	stands for gynecology or for a gynecologist, a physician who specializes in treating diseases of the female reproductive
IIDC	Image-Intensifier Distortion Correction
IOD	DICOM Information Object Definition
ISO	International Standard Organization
NEMA	National Electrical Manufacturers Association
O	Optional Key Attribute
OB	OB is short for obstetrics or for an obstetrician
PDU	DICOM Protocol Data Unit
R	Required Key Attribute
RIS	Radiology Information System
SC	Storage Commitment
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM server)
SOP	DICOM Service-Object Pair
U	Unique Key Attribute

In case **"*syngo*® Studio Workplaces"** is mentioned, all three deployments are meant. If the sentence applies only to the ***syngo*® Studio Advanced Workplaces**, this is explicitly written.

1.5 References

[1] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.15, 2007

[2] IHE Radiology Framework, Vol. I - III

[3] DCS "*syngo*® Imaging – *syngo*® Data Manager"

[4] DCS "*syngo*® Workflow MLR"

[5] DCS "*syngo*® Workflow SLR"

[6] DCS "*syngo*® Dynamics"

[7] DCS " *syngo*® Imaging XS"

All SIEMENS DICOM Conformance Statements can be obtained from www.siemens.com/dicom

1.6 Structure

This Conformance Statement is subdivided into multiple parts, which relate to individual documents needed to declare Conformance according to the requirements of “Part 2 - Conformance” of the DICOM Standard.

Those parts are:

- “Network Conformance Statement” for Network related Services:
  - Query – User
  - Print – User
- “Media Interchange Conformance Statement”

1.7 Scope and Field

syngo® Suite offers advanced RIS, PACS, and Processing in a comprehensive package for all imaging needs in radiology and cardiology and comprises *syngo*® Workflow, *syngo*® Dynamics and *syngo*® Imaging.

- *syngo*® Workflow drives the radiological workflow from order entry to image and report distribution.
- *syngo*® Dynamics is a multi-modality, dynamic image review, diagnosis and archiving system for cardiology, general imaging and OB/GYN.
- *syngo*® Imaging XS is a scalable solution that gives access to the world of digital image management.
- *syngo*® Imaging is a modular, scalable PACS solution for highest customer demands with focus on workflow, speed and usability.

The *syngo*® Suite consist of mainly three DICOM capable components (*syngo*® Workflow MLR /SLR, *syngo*® Data Manager, *syngo*® Studio Advanced Workplace).

Figure 1 gives an overview about the capabilities of the different parts.

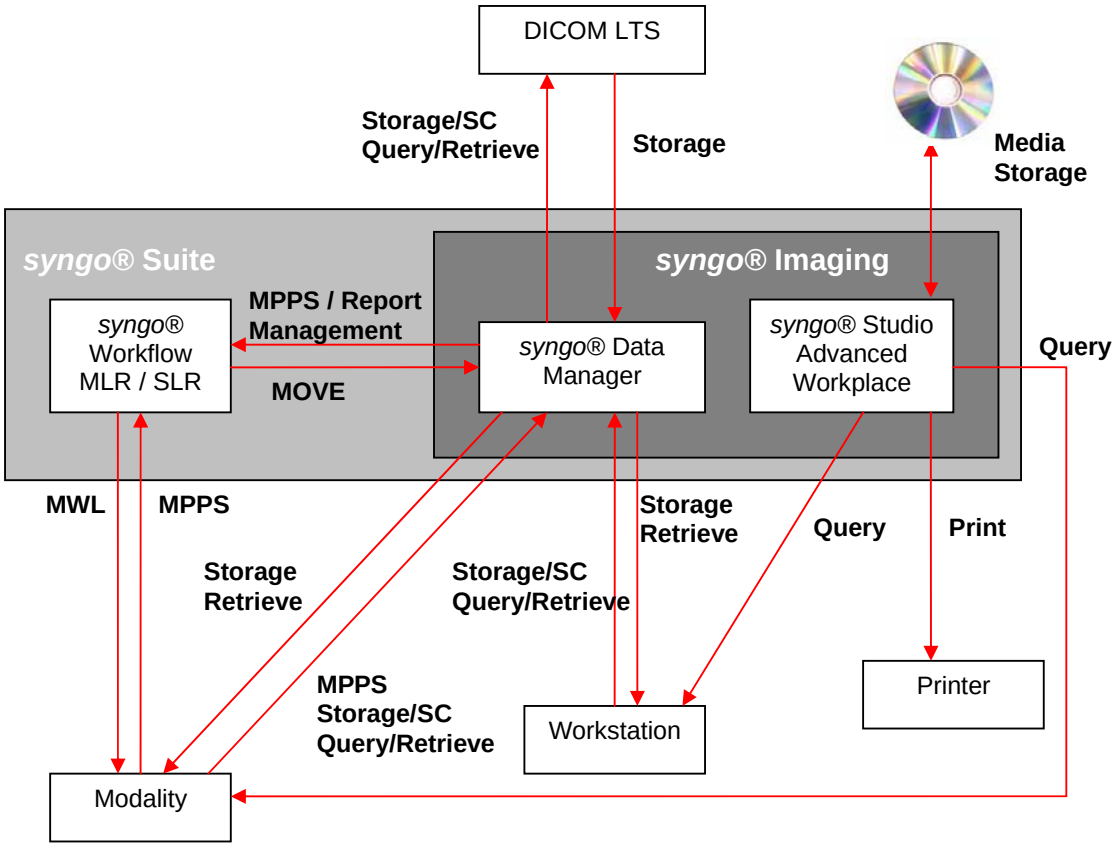

Figure 1: Overview about DICOM capabilities of syngo® Suite (with syngo® Imaging)

syngo® Imaging consists of two DICOM-speaking components, the *syngo*® Data Manager and the ***syngo*® Studio Workplaces**.

This document just describes the DICOM conformance of the *syngo*® Studio Workplaces.

syngo® Studio Workplaces of version V35A can be connected to a *syngo*® Data Manager of versions

- V35A
- V30A_SP2 or
- V30B.

Please refer to the related *syngo*® Data Manager DICOM Conformance Statement for the DICOM backend capabilities.

- *syngo*® Imaging – *syngo*® Data Manager (see [3])

Please note that the DICOM Conformance of the other components/products of the *syngo*® Suite is described in separate documents:

- *syngo*® Workflow MLR (see [3])
- *syngo*® Workflow SLR (see [4])
- *syngo*® Dynamics (see [5])
- *syngo*® Imaging XS (see [6])

2 Networking

2.1 Implementation Models

2.1.1.1 Application Data Flow

All three deployments of the ***syngo*® Studio Workplaces (Studio Advanced, Studio and Studio Web)** act as SCU for the query network service.

But only the ***syngo*® Studio Advanced Workplace** DICOM network implementation acts as SCU for the print network services.

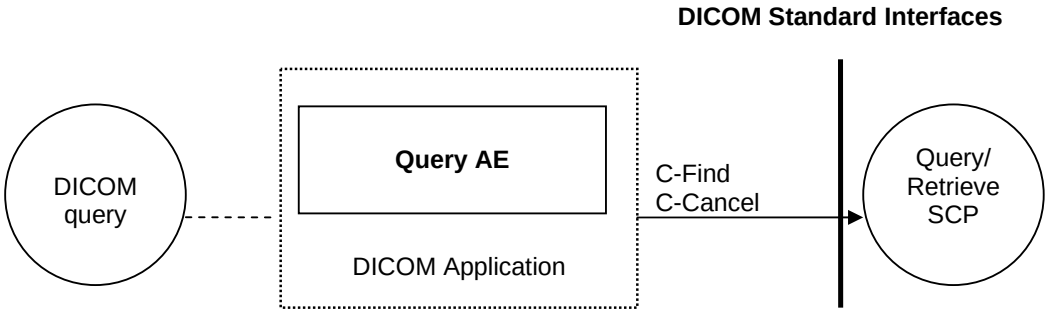

Figure 2: Application Data Flow Diagram – Query AE

The Query/Retrieve service classes define an application-level class of services which facilitates the management of images and patient data against the well defined information model of DICOM and allows a DICOM AE to retrieve images from a remote DICOM node or to request a remote DICOM AE to initiate a transfer of images to another DICOM AE.

The syngo Studio Workplaces support the real-world activity “Query/Retrieve” as follows:

- The “Search”-mask of the workplace is used to issue a query against the database of a remote DICOM node
- If desired, the user may initiate a retrieval of selected objects or may proceed with further queries
- The actual retrieval of the selected objects is done by the *syngo*® Data Manager.

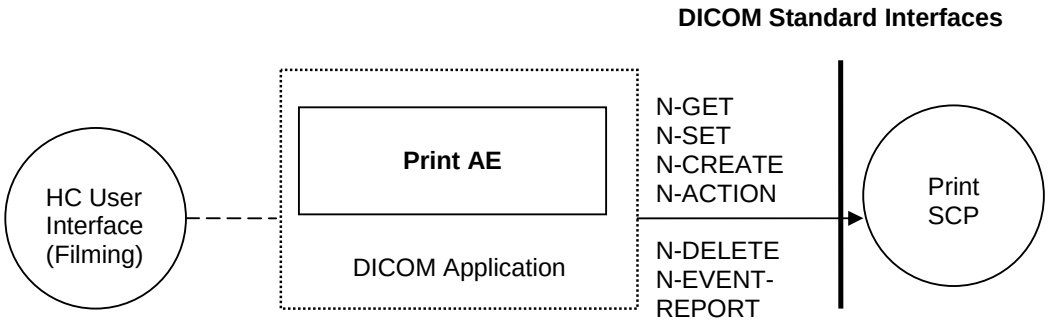

Figure 3: Application Data Flow Diagram – Print AE

The Print Management Service Classes define an application-level class of services, which facilitate the printing of images on a hardcopy medium. The print management SCU and print management SCP are peer DICOM print management application entities.

Note: The "Print" AE is optional within the ***syngo*® Studio Advanced Workplace** depending on licensing and configuration.

The ***syngo*® Studio Advanced Workplace** supports the real-world activity “Printing” as follows:

- The user loads relevant images into the “filming” application of ***syngo*® Studio Advanced Workplace**.
- The layout print settings may be adapted and the print job is sent to the printer.

2.1.2 Functional Definitions of Application Entities

2.1.2.1.1 Functional Definition of Query AE

All three deployments of the ***syngo*® Studio Workplace** initiate a C-FIND DIMSE request to the remote query SCP. The Query SCP returns a list of responses with defined data, which are displayed to the user. The user can decide to start a retrieval or to issue another query.

The ***syngo*® Studio (Advanced) Workplace** supports

- the Patient Root Query Model,
- the Study Root Query Model.

The current implementation only supports both relational and hierarchical query model.

2.1.2.1.2 Functional Definition of Print AE

The ***syngo*® Studio Advanced Workplace** DICOM print application supports the print management DIMSE services as SCU.

The ***syngo*® Studio Advanced Workplace** Print SCU is invoked by the user interface to setup film-sheet layout and whenever an image is ready to be printed on film. The ***syngo*® Studio Advanced Workplace** will hold and maintain all data needed to compile a complete film-sheet from the data (images, layout and configuration) received. Whenever a film-sheet is ready to print the related data is used to supply the Information to the SOP Classes of the Print Management Service Class. A queue is maintained, in order to intermediately store several film-sheets in case of resource problems on printer. The ***syngo*® Studio Advanced Workplace** will only supply and require the mandatory SOP Classes of the Print Management Service Class.

2.1.3 Sequencing of Real–World Activities

2.1.3.1 Sequencing of Real–World Activities of Sending

Figure 4 depicts the storage trigger within the *syngo*® Imaging environment.

In case the storage of DICOM objects is triggered from the ***syngo*® Studio Workplaces**, the objects are transmitted as follows:

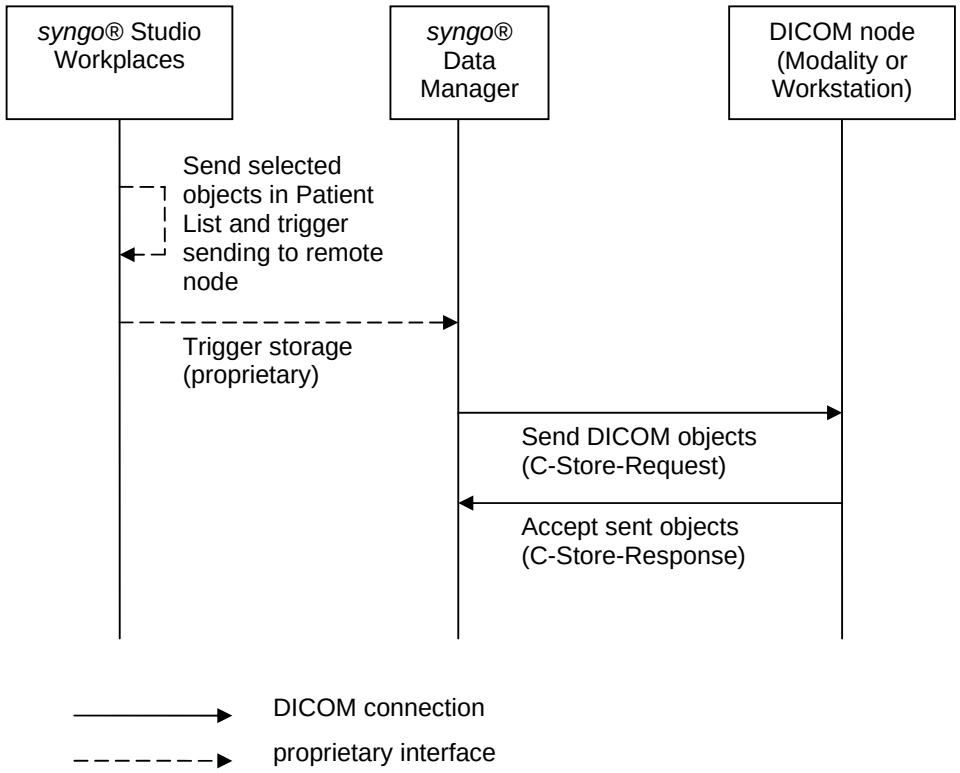

Figure 4: Storage issued via *syngo*® Data Manager

Please refer to DCS "*syngo*® Imaging – *syngo*® Data Manager" for further information on the storage capability of the *syngo*® Data Manager

Therefore any possible Storage SCP needs to configure the AE Title of the *syngo*® Data Manager.

2.1.3.2 Sequencing of Real–World Activities of the Query AE

The following figure depicts, that query and retrieval is not done by one component of the *syngo*® Suite, but is distributed over the *syngo*® Data Manager and the ***syngo*® Studio Workplaces**. Figure 5 indicates how query/retrieve is achieved:

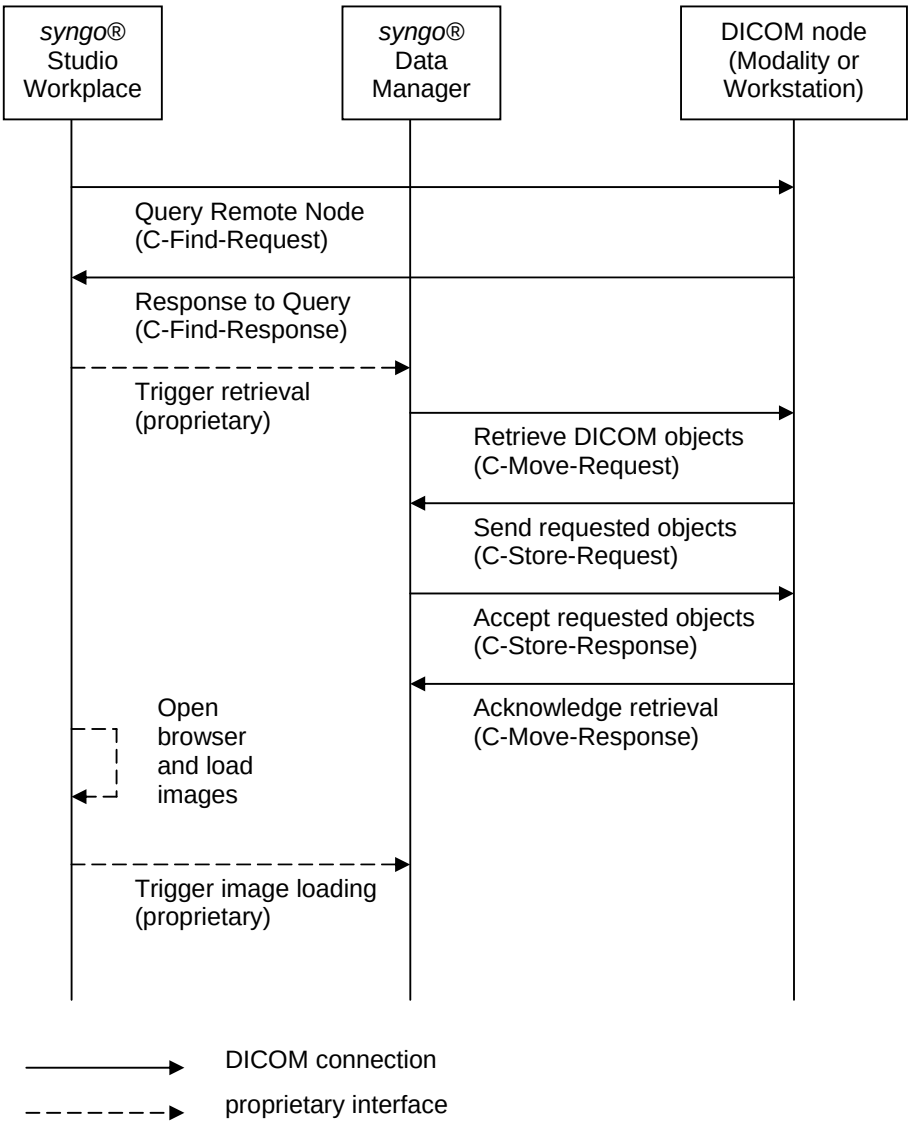

Figure 5: Sequence diagram - Query/Retrieve

2.1.3.3 Sequencing of Real–World Activities of the Print AE

The following picture describes the interaction between the ***syngo*® Studio Advanced Workplace** and the Print Server:

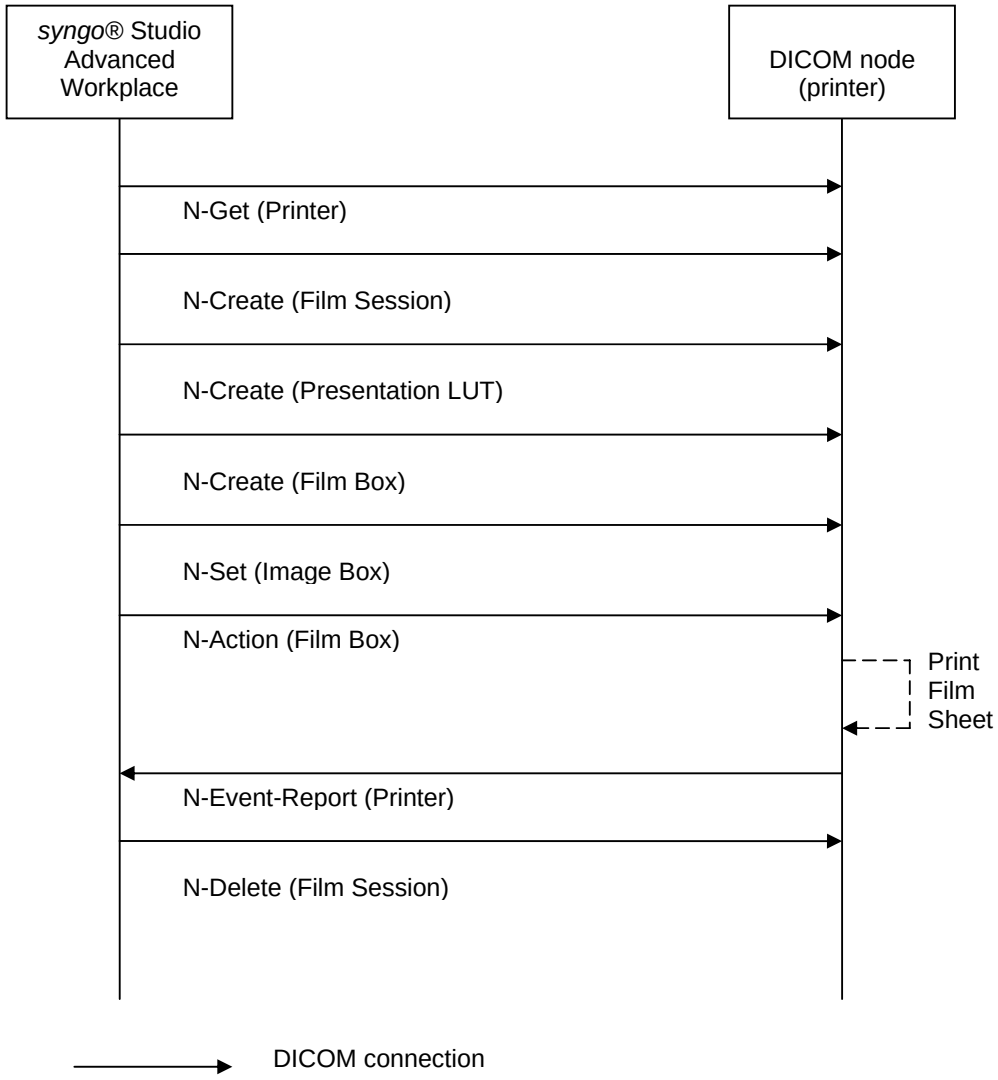

Figure 6: Sequence diagram - Printing

2.2 AE Specifications

2.2.1 Query AE

2.2.1.1 SOP Classes

The ***syngo*® Studio Workplaces** provide Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

SOP Class Name	SOP Class UID	Role
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	SCU
Study Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	SCU

Table 2: Query SOP classes supported as SCU

2.2.1.2 Association Policies

2.2.1.2.1 General

Application Context Name	1.2.840.10008.3.1.1.1

Table 3: Application Context Name

2.2.1.2.2 Number of Associations

The ***syngo*® Studio Workplaces** does not open more than 1 concurrent association.

Maximum number of simultaneous associations as an association acceptor	*Not applicable*
Maximum number of simultaneous associations as an association initiator	1

Table 4: Max. Number of associations

2.2.1.2.3 Asynchronous Nature

The ***syngo*® Studio Workplaces** DICOM software do not support asynchronous communication (multiple outstanding transactions over a single association).

Maximum number of outstanding asynchronous transactions	not supported

Table 5: Max. Number of asynchronous transactions

2.2.1.2.4 Implementation Identifying Information

The ***syngo*® Studio Workplaces** provide a single Implementation Class UID of:

Implementation Class UID	1.3.12.2.1107.5.9.20000101
Implementation Version Name	SIEMENS_SWFSYNGO

Table 6: Implementation Identifying Information

2.2.1.3 Association Initiation Policy

The ***syngo*® Studio Workplaces** will initiate new associations for the following operations as SCU:

Operation or Real–World Activity	Association for
Querying a Remote Node	C-FIND
Cancel Querying a Remote Node	C-FIND-CANCEL

Table 7: Association Initiation Policy - Query AE

2.2.1.3.1 Activity "Querying a Remote Node"

2.2.1.3.1.1 Description and Sequencing of Activities

The associated Real-World activity is a C-Find request initiated by the user at the ***syngo*® Studio Workplaces**. The user specifies some attributes the remote Application should use to query its database. If the query user successfully establishes an association to the remote Application Entity, it will send a C-Find request (according to the query model) and will then return the results to the application.

2.2.1.3.1.2 Proposed Presentation Contexts

The ***syngo*® Studio Workplaces** will propose Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Patient Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5. 1.4.1. 2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	Yes
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Study Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5. 1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	Yes
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

Table 8: Presentation Contexts – Query

Name	UID	Extended Negotiation
Patient Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1. 2.1.1	Relational query model supported
Study Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.2.1	Relational query model supported

Table 9: Extended Negotiation as a SCU

2.2.1.3.1.3 SOP Specific Conformance Statement to Query SOP classes

The ***syngo*® Studio Workplaces** check for the following status codes in the Query SCP's C-Find-Response:

Service Status	Meaning	Protocol Codes
Success	Matching is complete	0000
Pending	Matches are continuing	FF00
Pending	Matches are continuing, no option key support	FF01
Refused	Out of Resources	A700
Cancel		FE00

The ***syngo*® Studio Workplaces** support following query levels:

- Patient
- Study
- Series

The below Table 10 lists the various attributes at Patient, Study, and Series levels, which can be used for queries by the user:

Attribute	Tag	Type	Query key in UI	User Input/Display
Attributes at Patient Level				
Patient Name	(0010,0010)	R	Yes	Yes
Patient ID	(0010,0020)	U	Yes	Yes
Patient's Birth Date	(0010,0030)	O	Yes	Yes
Patient Sex	(0010,0040)	O	Yes	Yes
Attributes at Study Level				
Study Date	(0008,0020)	R	Yes	Yes
Study Time	(0008,0030)	R	Yes	Yes
Accession Number	(0008,0050)	R	Yes	Yes
Referring Physician's Name	(0008,0090)	O	Yes	Yes
Modalities in Study	(0008,0061)	O	Yes	Yes
Attributes at Series Level				
Modality	(0008,0060)	R	Yes	Yes
Body Part Examined	(0018,0015)	O	Yes	Yes
Series Number	(0020,0011)	R	Yes	Yes
PPS Date / Time	(0040,0244) / (0040,0245)	O	Yes	No
Scheduled Procedure Step ID	(0040,0009)	O	Yes	No
Requested Procedure ID	(0040),1001)	O	Yes	No

Table 10: Attributes supported for query

The following table indicates, which SOP classes are supported to be displayed within the viewer:

SOP Class Name	SOP Class UID
CR Computed Radiography Object Storage	1.2.840.10008.5.1.4.1.1.1
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
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
US Multi-frame Object Storage	1.2.840.10008.5.1.4.1.1.3.1
US Multi-frame Object Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1
US Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
SC Image Storage	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1
Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.2
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
NM Image Storage	1.2.840.10008.5.1.4.1.1.20
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.1.29
Hardcopy Color Image Storage	1.2.840.10008.5.1.1.30
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
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
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
Digital X-Ray Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.1
Digital X-Ray Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography X-Ray Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-oral X-Ray Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.3.1
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 11: SOP Classes supported by the viewer

2.2.2 Print AE

The ***syngo*® Studio Advanced Workplace** Print Management SCU invokes print management DIMSE services to print images with a defined layout on a selected network-based DICOM hardcopy printer. This is done in a “full-page” print mode.

2.2.2.1 SOP Classes

The ***syngo*® Studio Advanced Workplace** provides Standard Conformance to the DICOM V3.0 Print Management Meta SOP Classes listed in Table 12: Grayscale Print Management META SOP classes supported as SCU and Table 13: Color Print Management META SOP classes supported as SCU:

SOP Class Name	SOP Class UID
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
- Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
- Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
- Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
- Printer SOP Class	1.2.840.10008.5.1.1.16
Print Job SOP Class	1.2.840.10008.5.1.1.14
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23

Table 12: Grayscale Print Management META SOP classes supported as SCU

SOP Class Name	SOP Class UID
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18
- Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
- Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
- Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1
- Printer SOP Class	1.2.840.10008.5.1.1.16
Print Job SOP Class	1.2.840.10008.5.1.1.14

Table 13: Color Print Management META SOP classes supported as SCU

2.2.2.2 Association Policies

2.2.2.2.1 General

Whenever a film is completely set up and printed by command or automatism, the job is prepared for processing. As soon as the queue is ready to process the job is activated and worked according to the processing data. The related Print application will initiate an association to the print destination and process the printing of the related information.

The default PDU size used will be 28 KB.

2.2.2.2.2 Number of Associations

The ***syngo*® Studio Advanced Workplace** Print application initiates one association in parallel for each different print device configured.

2.2.2.2.3 Asynchronous Nature

The ***syngo*® Studio Advanced Workplace** DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

Maximum number of outstanding asynchronous transactions	not supported

Table 14: Max. Number of asynchronous transactions

2.2.2.2.4 Implementation Identifying Information

The ***syngo*® Studio Advanced Workplace** DICOM software provides a single Implementation Class UID of:

Implementation Class UID	1.3.12.2.1107.5.9.20000101
Implementation Version Name	SIEMENS_SWFSYNGO

Table 15: Implementation Identifying Information

2.2.2.3 Association Initiation Policy

The ***syngo*® Studio Advanced Workplace** DICOM application will initiate new associations for the following DIMSE-C operations as SCU:

- N-GET
- N-CREATE
- N-SET
- N-ACTION

Triggered by the Print job queue the Print Management SCU establishes an association by using the DICOM association services. With the help of the N-GET request for the Printer SOP Class, the status of the printer is determined before printing.

With no problem encountered with the N-CREATE/N-SET Services for the related Basic Print SOP Classes the film sheet is set up for printing and the image(s) is(are) transferred to the printer device.

After the last film is printed from queue, the Print application will leave the association open for another 60 seconds. If a new film job is ready for printing within this time-limit, the job will be immediately processed over the still open association. If there is no new job, the association is closed if the time-out elapsed. This is done to optimize automated printing.

During the “idle-time” (no open association to printer) the Print application will issue a cyclic camera status request (using N-GET of Printer SOP Class) every 5 minutes.

2.2.2.3.1 Activity “Printing to a Remote Node”

2.2.2.3.1.1 Description and Sequencing of Activities

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

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

If the response from the remote application contains a status other than Success or Warning the association is aborted.

2.2.2.3.1.2 Proposed Presentation Contexts

The ***syngo*® Studio Advanced Workplace** will propose Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Printer SOP Class	1.2.840.10008.5.1.1.16	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Print Job SOP Class	1.2.840.10008.5.1.1.14	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
Presentation LUT SOP Class	1.2.840.10008.5.1.1.23	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		

Table 16: Presentation Contexts supported as Print SCU

2.2.2.3.1.3 SOP Specific Conformance Statement for Print SOP classes

The ***syngo*® Studio Advanced Workplace** Print SCU conforms to the DICOM Basic Grayscale Print Management Meta SOP Class and the Basic Color Print Management Meta SOP Class.

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

- maximum number of print jobs in the queue
- maximum number of print copies
- supported film sizes of the connected DICOM SCP
- supported film formats of the DICOM SCP
- lookup table definition.

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

2.2.2.3.1.3.1 Basic Film Session SOP Class

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

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

- N-CREATE
- N-DELETE

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

Attribute Name	Tag	Usage SCU	Supported Values
Number of Copies	(2000,0010)	U	1
Medium Type	(2000,0030)	U	BLUE FILM
			CLEAR FILM
			PAPER
Film Destination	(2000,0040)	U	MAGAZINE
			PROCESSOR

Table 17: Attribute of N-Create-Request of Basic Film Session

The number of Copies sent to the DICOM Printer is always 1, the job is sent n times for n copies.

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

Attribute Name	Tag	Source of Information
Requested SOP Instance UID	(0000,1000) --> (0000,1001)	Affected SOP Instance UID of N-CREATE-RSP on Basic Film Session

Table 18: Requested SOP Instance UID for Basic Film Session

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

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

Service Status	Meaning	Error Codes
Failed	Film session SOP instances hierarchy does not contain film box SOP instances	C600
	Unable to create print job, print queue is full	C601
	Image size is larger than images box size	C603
Warning	Memory allocation not supported	B600
	Film session printing is not supported	B601
	Film box does not contain image box (empty page)	B602
Success	Film belonging to the film session are accepted for printing	0000

Table 19: Status codes for Basic Film Session messages

2.2.2.3.1.3.2 Basic Film Box SOP Class

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

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

Supported Service Elements as SCU are:

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

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

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

Table 20: Attributes for N-CREATE-RQ of Basic Film Box

For Page Mode printing, the Image Display format used is Standard\1,1. For Image Mode Printing, the Image Display format used is Standard\C,R where C is the number of Columns and R is the number of Rows as specified in the Hardcopy Layout.

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

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

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

Attribute Name	Tag	Source of Information
Requested SOP Instance UID	(0000,1000) => (0000,1001)	Affected SOP Instance UID of N-CREATE-RSP on Basic Film Box

Table 21: Requested SOP Instance UID for Basic Film Box

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

Service Status	Meaning	Error Codes
Failure	Unable to create print job, print queue is full	C602
	Image size is larger than images box size	C603
Warning	Film box does not contain image box (empty page)	B603
	Requested MinDensity or MaxDensity outside of Printer's operating range	B605
Success	Film accepted for printing	0000

Table 22: Status codes for Basic Film Box messages

2.2.2.3.1.3.3 Basic Grayscale Image Box SOP Class

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

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

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

Table 23: Attributes for N-SET-RQ of Basic Grayscale Image Box

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

Service Status	Meaning	Error Codes
Failure	Image contains more pixel than printer can print in Image Box	C603
	Insufficient memory in printer to store the image	C605
Warning	Requested MinDensity or MaxDensity outside of Printer's operating range	B605
Success		0000

Table 24: Status Codes for Basic Grayscale Image Box messages

2.2.2.3.1.3.4 Basic Color Image Box SOP Class

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

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

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

Table 25: Attributes for N-SET-RQ of Basic Color Image Box

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

Service Status	Meaning	Error Codes
Failure	Image contains more pixel than printer can print in Image Box	C603
	Insufficient memory in printer to store the image	C605
Warning	Image size larger than image box size	B604
Success		0000

Table 26: Status codes for Basic Color Image Box messages

2.2.2.3.1.3.5 Presentation LUT SOP Class

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

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

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

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

Table 27: Attributes for N-CREATE-RQ of Presentation LUT SOP Class

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

Attribute Name	Tag	Source of Information
Requested SOP Instance UID	(0000,1000) => (0000,1001)	Affected SOP Instance UID of N-CREATE-RSP on Presentation LUT

Table 28: Requested SOP Instance UID for Presentation LUT SOP Class

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

Service Status	Meaning	Error Codes
Warning	Requested MinDensity or MaxDensity outside of HCD's operating range. HCD will use its respective minimum or maximum density value instead.	B605
Success	Presentation LUT successfully created	0000

Table 29: Status Codes for Presentation LUT SOP Class

2.2.2.3.1.3.6 Printer SOP Class

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

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

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

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

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

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

Table 30: Used Printer N-EVENT-REPORT attributes

Attribute Name	Tag	Usage SCP	Supported Values
Printer Status	(2110,0010)	M	NORMAL, FAILURE, WARNING
Printer Status Info	(2110,0020)	M	See tables in Annex for details.

Table 31: Mandatory Printer N-GET-RSP, N-EVENT-REPORT-RQ attributes

Note: For a detailed description on how *syngo*® Studio Advanced Workplace reacts on different printer status messages, please refer to the section "DICOM Print SCU – detailed status displays".

2.2.2.3.1.3.7 Print Job SOP Class

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

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

Note: The *syngo*® DICOM Print Management application does not support receiving N-EVENT-REPORT requests from the camera during print sessions. Normally this is configurable in the camera. Refer to Table 32: Used Print Job N-EVENT-REPORT attributes for the N-EVENT-REPORT attributes the *syngo*® DICOM Print Management application can handle.

Event-type Name	Event	Attributes	Tag	Usage SCU
Pending	1	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U
Printing	2	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U
Done	3	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U
Failure	4	Execution Status Info	(2100,0030)	U
		Print Job ID	(2100,0010)	-- (Print Queue Management SOP Class not supported)
		Film Session Label	(2000,0050)	U
		Printer Name	(2110,0030)	U

Table 32: Used Print Job N-EVENT-REPORT attributes

Note: For a detailed description on how *syngo*® Studio Advanced Workplace reacts on different printer status messages, please refer to the Annex section “DICOM Print SCU – detailed status displays”.

2.2.2.4 Association Acceptance Policy

The ***syngo*® Studio Advanced Workplace** does not accept any DICOM association.

2.3 Network Interfaces

The ***syngo*® Studio Workplaces** are independent of the physical medium over which TCP/IP executes; it inherits this from the operating system upon which it executes.

2.4 Configuration

Note: The following configuration depends on the deployment of *syngo*® Studio (Advanced) Workplace and acquired software licenses.

2.4.1 AE Title/Presentation Address Mapping

To ensure unique identification within the network the hostname should be used as part of the AE Titles. The string can be up to 16 characters long and must not contain any extended characters, only 7-bit ASCII characters (excluding Control Characters) are allowed according to DICOM Standard.

Note: the current implementation of *syngo*® does not support the full DICOM Standard. Spaces and special characters (like &<> ") in the AE title string are not supported.

2.4.1.1 Local AE Title

2.4.1.1.1 Query SCU AET

The DICOM Query application uses a fixed AE Title:

- SYNGOWP

This AE Title can only be changed by Service Personnel.

2.4.1.1.2 Print SCU AET (only for *syngo*® Studio Advanced Workplace)

The DICOM Print application provides following default application entity title:

- e.g. PRI_NAME1

The AE Title can be changed by Service Personnel, the input must not start with a numeric character.

2.4.1.2 Remote AE Title

The Query SCPs are configured syngo Imaging wide via the Service Module of the Operation Manager (OPM).

The Print SCPs have to be configured for each available ***syngo*® Studio Advanced Workplace** using the console's Service Software.

2.4.2 Configurable Parameters – Print

Following parameters are mandatory to be set:

- AET
- hostname
- IP-address
- Port-number

These parameters have defaults as per configuration file and can be changed:

- default camera (yes/no)
- pixel size
- additional or changed film sheet formats (e.g. inch 14x14, inch 14x17, ...)
- list with mapping pixel size to each film sheet format
- minimal density
- stored printed film jobs
- media type
- film destination

2.4.3 Default Parameters

Below some of the parameters and their default value:

Parameter	Value
max PDU size set to	524 KBytes
time-out for accepting/rejecting an association request:	60s
time-out for responding to an association open/close request:	60s
time-out for accepting a message over network:	60s
time-out for waiting for data between TCP/IP-packets:	60s
The time-outs for waiting for a Service Request/Response message from the remote node are as follows:	
for Query SCU:	600s
for Print Management SCU:	
time-out for Response to N-SET-RQ:	240s
time-out for Response to other Requests:	60s

Table 33: Default Parameter List

3 Media Interchange

3.1 Implementation Models

3.1.1 Application Data Flow

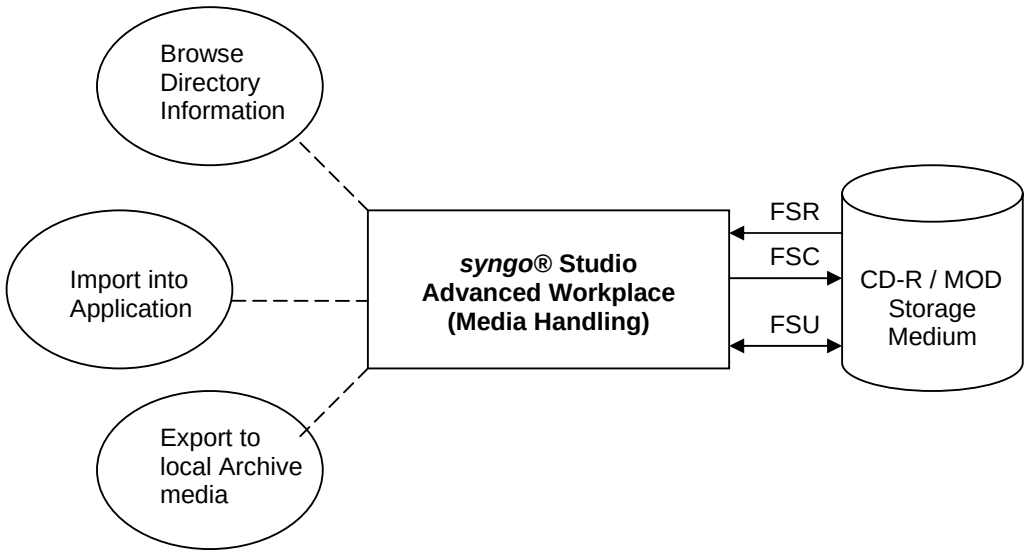

Figure 7: Application Data Flow Diagram – Media Interchange

The ***syngo*® Studio Advanced Workplace** application will serve as an interface to the offline medium device. It serves interfaces to include the offline media directory into the browser and to copy SOP instances to a medium or retrieve SOP Instances from medium to the Viewing Application.

The ***syngo*® Studio Advanced Workplace** application will support

- the 120mm CD-R and DVD medium
- the 130mm 2.3 GB R/W MOD
- the 130mm 4.1 GB R/W M.

3.1.2 Functional Definitions of AEs

The ***syngo*® Studio Advanced Workplace** application is capable of

- creating a new File-set onto an unwritten medium (Export to ...)
- updating an existing File-set by writing new SOP Instances onto the medium (Export to...)
- importing SOP Instances from the medium onto local storage
- reading the File-sets DICOMDIR information into temporary database and pass it to the Viewing Application.

3.1.3 Sequencing of Real-World Activities

The ***syngo*® Studio Advanced Workplace** application will not perform updates before the Directory information of the DICOMDIR is completely read.

When performing updates, the SOP instances are checked for existence before updating. Duplicate instances will be avoided.

3.1.4 File Meta Information for Implementation Class and Version

Implementation Class UID	1.3.12.2.1107.5.9.20000101
Implementation Version Name	SIEMENS_SWFSYNGO

Table 34: Implementation Class/Version Name - Media Interchange

3.2 AE Specifications

3.2.1 Media Handling AE

The ***syngo*® Studio Advanced Workplace** provides Standard conformance to Media Storage Service Class (Interchange Option).

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

Application Profiles Supported	Real-World Activity	Role	Service Class Option
PRI-*SYNGO*®-CD	Browse Directory Information Import into Application Export to local Archive Media	FSR FSR FSC,FSU	Interchange Interchange Interchange
PRI-*SYNGO*®-MOD23 (option)			
PRI-*SYNGO*®-MOD41 (option)			
PRI-*SYNGO*®-FD			
AUG-GEN-CD			
AUG-CTMR-MOD650			
AUG-CTMR-MOD12a			
AUG-CTMR-MOD23a			
AUG-CTMR-CDa			
AUG-XA1K-CDa			
STD-GEN-CD	Browse Directory Information Import into Application	FSR FSR	Interchange Interchange
STD-CTMR-MOD650			
STD-CTMR-MOD12			
STD-CTMR-MOD23			
STD-CTMR-CD			
STD-XABC-CD			
STD-XA1K-CD			
STD-US-zz-yF-xxxxxx			
STD-WVFM-GEN-FD			

Table 35: Media - Application Profiles and Real-World Activities

The Private Extended *syngo*® Profile (PRI-*SYNGO*®-CD) will be preferably used by the system. The General Purpose Interchange Profile (STD-GEN-CD), Ultrasound Profile (STD-US-xxx), CT and MR Image Profile (STD-CTMR-xxx), Waveform Interchange (STD-WVFM-xxx), Basic Cardiac Profile (STD-XABC-CD) and 1024 X-Ray Angiographic Profile (STD-XA1K-CD) will be supported with read capability of the related media.

3.2.1.1 Real-World Activities

3.2.1.1.1 Activity "Browse Directory Information"

The ***syngo*® Studio Advanced Workplace** acts as FSR using the interchange option when requested to read the media directory.

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

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

3.2.1.1.1.1 Media Storage Application Profiles

See Table 35 for the Application Profiles listed that invoke this Application Entity for the Browse Directory Information

3.2.1.1.2 Activity "Import into Application"

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

The SOP Instance selected from the media directory will be copied into the running Application. Only SOP Instances, that are valid for the application profile supported and supported by the ***syngo*® Studio Workplaces** (see Table 11), can be retrieved from media.

Notes:

- During operation no "Attribute Value Precedence" is applied to the SOP Instances.
- Detached Patient Management is not supported (please refer to DICOM Part 11, Media Storage Application Profiles).

For media conforming to the STD-GEN-CD Profile the SOP classes listed below will be supported as an FSR:

Information Object Definition	SOP Class UID	Transfer Syntax	UID
CR Image	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
CT image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
DX Image-For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
DX Image-For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
IOX Image-For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
IOX Image-For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Explicit VR Little Endian	1.2.840.10008.1.2.1
MG Image-For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
MG Image-For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian	1.2.840.10008.1.2.1
NM Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian	1.2.840.10008.1.2.1
PET Image	1.2.840.10008.5.1.4.1.1.128	Explicit VR Little Endian	1.2.840.10008.1.2.1
RT Image	1.2.840.10008.5.1.4.1.1.481.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1
Ultrasound Image (retired)	1.2.840.10008.5.1.4.1.1.6	Explicit VR Little Endian	1.2.840.10008.1.2.1
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
Ultrasound Multi-frame Image (retired)	1.2.840.10008.5.1.4.1.1.3	Explicit VR Little Endian	1.2.840.10008.1.2.1
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian	1.2.840.10008.1.2.1

Table 36: Media FSR - supported SOP Classes

3.2.1.1.2.1 Media Storage Application Profiles

See Table 35 for the Application Profiles listed that invoke this Application Entity for the Import into local Storage Real-World Activity.

3.2.1.1.3 Real-World Activity "Export to local Archive Media"

The ***syngo*® Studio Advanced Workplace** application acts as FSU (for media with existing DICOM file-set) or FSC (media not initialized) using the interchange option when requested to copy SOP Instances from the local storage to local Archive Medium.

The ***syngo*® Studio Advanced Workplace** application will receive a list of SOP Instances to be copied to the local archive medium. According to the state of the medium inserted (new medium, Medium with DICOM file-set) the validity of the SOP Instances according to the applicable profile is checked. Only valid SOP Instances are accepted.

When the ***syngo*® Studio Advanced Workplace** application is requested to copy SOP Instances the preferred application profile according configuration will be used to validate and copy the referred SOP Instances. When creating a new file-set, no Descriptor File will be allocated and the related ID is not used.

The ***syngo*® Studio Advanced Workplace** application will not close the medium.

3.2.1.1.3.1 Media Storage Application Profiles

See Table 35 for the Application Profiles listed that invoke this Application Entity for the local Archive Media Real-World Activity.

3.3 Augmented and Private Profiles

3.3.1 Augmented Application Profiles

3.3.1.1 AUG-GEN-CD

With no private Siemens Non-Images stored onto Medium, the definitions of the PRI-*SYNGO*®-CD Profile are applicable to denote the augmentations for the STD-GEN-CD Standard Profile.

Storage of Private Information Objects will only be supported with reference to a Private Application Profile (see next section).

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

3.3.1.2 AUG-CTMR-xxxxx

With no private Siemens Non-Images stored onto Medium, the definitions of the PRI-*SYNGO*®-CD Profile are applicable to denote the augmentations for the STD-CTMR-MOD650, STD-CTMR-MOD12, STD-CTMR-MOD23 and STD-CTMR-CDR Standard Profiles.

Storage of Private Information Objects will only be supported with reference to a Private Application Profile (see next section).

3.3.1.3 AUG-XA1K-CD

With no private Siemens Non-Images stored onto Medium, the definitions of the PRI-*SYNGO*®-CD Profile are applicable to denote the augmentations for the STD-XA1K-CD Standard Profile.

Storage of Private Information Objects will only be supported with reference to a Private Application Profile (see other section).

3.4 *syngo*® private offline Media Application Profile

Will contain a *syngo*® specific Application Profile.

Structure of this Application Profile is defined in Part 11 of the 2000 DICOM Standard.

It is needed to describe the requirements for Offline Media Storage of the private IOD (Non-Image IOD).

3.4.1 Class and Profile Identification

This document defines an Application Profile Class for "*syngo*® speaking[1]" modalities or applications.

The identifier for this class shall be PRI-*SYNGO*®. This class is intended to be used for interchange of extended and private Information Objects via CD-R or re-writeable magneto-

[1] *syngo*® is a registered trademark of Siemens AG.

optical disk (MOD) offline media between dedicated acquisition or workstation modalities build from a common *syngo*® architecture.

The specific application profiles in this class are shown in Table below:

Application Profile	Identifier	Description
"*syngo*® speaking" System on CD-R	PRI-*SYNGO*®-CD	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).
"*syngo*® speaking" System on 2.3 GB MOD	PRI-*SYNGO*®-MOD23	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).
"*syngo*® speaking" System on 4.1 GB MOD[1]	PRI-*SYNGO*®-MOD41	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).
"*syngo*® speaking" System on DVD R	PRI-*SYNGO*®-DVD	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).

Table 37: PRI-*SYNGO*®-CD – Application Profiles

Equipment claiming conformance for this *syngo*® Application Profile Class shall make a clear statement on handling of the private defined SOP Instances.

3.4.2 Clinical Context

This application profile facilitates the interchange of original acquired and derived images and private data related to them. Typical media interchange would be from in-lab acquisition equipment to dedicated workstations and archive systems with specific extensions to handle the private data objects (in both directions).

Additionally, images (from MR,CT,US,NM,DX,RF) used to prepare procedures, multi-modality images (e.g. integrated US) and images derived from primary diagnostic images, such as annotations, quantitative analysis images, reference images, screen capture images may be interchanged via this profile.

3.4.2.1 Roles and Service Class Options

This Application Profile uses the Media Storage Service Class defined in PS 3.4 with the Interchange Option.

The Application Entity shall support one or more of the roles of File Set Creator (FSC), File Set Reader (FSR), and File Set Updater (FSU), defined in PS 3.10.

3.4.2.1.1 File Set Creator

The Application Entity acting as a File-Set Creator generates a File Set under the PRI-*SYNGO*® Application Profiles.

File Set Creators shall be able to generate the Basic Directory SOP Class in the DICOMDIR file with all the subsidiary Directory Records related to the Image SOP Classes and Private SOP Classes stored in the File Set.

In case of the PRI-*SYNGO*®-CD profile, the FSC shall offer the ability to either finalize the disc at the completion of the most recent write session (no additional information can be subsequently added to the disc) or to allow multi-session (additional information may be subsequently added to the disc). In case of the PRI-*SYNGO*®-DVD profile only multi-session is supported. For both profiles a multi-session media can be finalized.

[1] Definition of this profile is done due to approval of DICOM Supplement 62.

Note: A multiple volume (a logical volume that can cross multiple physical media) is not supported by this Application Profile Class. If a set of Files, e.g., a Study, cannot be written entirely on one CD-R, the FSC will create multiple independent DICOM File-Set such that each File-Set can reside on a single CD-R medium controlled by its individual DICOMDIR file. The user of the FSC can opt to use written labels on the discs to reflect that there is more than one disc for this set of files (e.g., a Study).

3.4.2.1.2 File Set Reader

The role of the File Set Reader shall be used by Application Entities which receive the transferred File Set.

File Set Readers shall be able to read all the defined SOP Instances files defined for the specific Application Profiles to which a conformance claim is made, using all the defined Transfer Syntaxes.

3.4.2.1.3 File Set Updater

The role of the File Set Updater shall be used by Application Entities, which receive a transferred File Set and update it by the addition of processed information.

File Set Updaters shall be able to read and update the DICOMDIR file. File-Set Updaters do not have to read the image/private information objects. File-Set Updaters shall be able to generate any of the SOP Instances files defined for the specific Application Profiles to which a conformance claim is made, and to read and update the DICOMDIR file.

In case of the PRI-*SYNGO*®-CD profile, the FSU shall offer the ability to either finalize a disc at the completion of the most recent write session (no additional information can be subsequently added to the disc) or to allow multi-session (additional information may be subsequently added to the disc). In case of the PRI-*SYNGO*®-DVD profile only multi-session is supported. For both profile a multi-session media can be finalized.

Note (for CD-R and DVD-R): If the disc has not been finalized, the File-Set Updater will be able to update information assuming there is enough space on the disc to write a new DICOMDIR file, the information, and the fundamental CD-R/DVD-R control structures. CD-R/DVD-R control structures are the structures that inherent to the CD-R/DVD-R standards; see PS 3.12

3.4.3 PRI-*SYNGO*® Profiles

3.4.3.1 SOP Classes and Transfer Syntaxes

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

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSC	FSR	FSU
Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	M
CR Image	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSC	FSR	FSU
	1.2.840.10008.5.1.4.1.1.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.1	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
	1.2.840.10008.5.1.4.1.1.1	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	O	O
	1.2.840.10008.5.1.4.1.1.1	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	O	O
CT image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.2	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.2	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.2	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
	1.2.840.10008.5.1.4.1.1.2	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	O	O
	1.2.840.10008.5.1.4.1.1.2	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	O	O
DX Image – For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.1.1.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.1.1.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.1.1.1	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
DX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.1.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.1.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.1.1	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
	1.2.840.10008.5.1.4.1.1.1.1	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	O	O
	1.2.840.10008.5.1.4.1.1.1.1	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	O	O
MG Image – For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.1.2.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.1.2.1	Explicit VR Big Endian	O	M	O

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSC	FSR	FSU
		Uncompressed 1.2.840.10008.1.2.2			
	1.2.840.10008.5.1.4.1.1.1.2.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.1.2.1	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
MG Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.1.2	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.1.2	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.1.2	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
	1.2.840.10008.5.1.4.1.1.1.2	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	O	O
	1.2.840.10008.5.1.4.1.1.1.2	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	O	O
IOX Image – For Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.1.3.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.1.3.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.1.3.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.1.3.1	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
IOX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.1.3	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.1.3	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.1.3	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.1.3	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
	1.2.840.10008.5.1.4.1.1.1.3	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	O	O
	1.2.840.10008.5.1.4.1.1.1.3	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	O	O
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.4	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.4	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSC	FSR	FSU
	1.2.840.10008.5.1.4.1.1.4	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.4	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
	1.2.840.10008.5.1.4.1.1.4	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	O	O
	1.2.840.10008.5.1.4.1.1.4	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	O	O
NM Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.20	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.20	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.20	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
	1.2.840.10008.5.1.4.1.1.20	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	O	O
	1.2.840.10008.5.1.4.1.1.20	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	O	O
PET Image	1.2.840.10008.5.1.4.1.1.128	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.128	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.128	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.128	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.128	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
	1.2.840.10008.5.1.4.1.1.128	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	O	O
	1.2.840.10008.5.1.4.1.1.128	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	O	O
RT Image	1.2.840.10008.5.1.4.1.1.481.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.481.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.481.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.481.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.481.1	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
	1.2.840.10008.5.1.4.1.1.481.1	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	O	O
	1.2.840.10008.5.1.4.1.1.481.1	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	O	O
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSC	FSR	FSU
	1.2.840.10008.5.1.4.1.1.7	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.7	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.7	RLE Lossless 1.2.840.10008.1.2.5	O	O	O
	1.2.840.10008.5.1.4.1.1.7	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	O	O
	1.2.840.10008.5.1.4.1.1.7	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	O	O
Ultrasound Image (retired)	1.2.840.10008.5.1.4.1.1.6	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	-	M	-
	1.2.840.10008.5.1.4.1.1.6	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	-	M	-
	1.2.840.10008.5.1.4.1.1.6	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	-	M	-
	1.2.840.10008.5.1.4.1.1.6	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	-	M	-
	1.2.840.10008.5.1.4.1.1.6	RLE Lossless 1.2.840.10008.1.2.5	-	M	-
	1.2.840.10008.5.1.4.1.1.6	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	-	M	-
	1.2.840.10008.5.1.4.1.1.6	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	-	M	-
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.6.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.6.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	M	O
	1.2.840.10008.5.1.4.1.1.6.1	RLE Lossless 1.2.840.10008.1.2.5	O	M	O
	1.2.840.10008.5.1.4.1.1.6.1	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	M	O
	1.2.840.10008.5.1.4.1.1.6.1	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	M	O
Ultrasound Multi-frame	1.2.840.10008.5.1.4.1.1.3	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	-	M	-
	1.2.840.10008.5.1.4.1.1.3	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	-	M	-
	1.2.840.10008.5.1.4.1.1.3	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	-	M	-
	1.2.840.10008.5.1.4.1.1.3	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	-	M	-
	1.2.840.10008.5.1.4.1.1.3	RLE Lossless 1.2.840.10008.1.2.5	-	M	-
	1.2.840.10008.5.1.4.1.1.3	JPEG 2000 Lossless	-	M	-

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSC	FSR	FSU
		1.2.840.10008.1.2.4.90			
	1.2.840.10008.5.1.4.1.1.3	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	-	M	-
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M	M	O
	1.2.840.10008.5.1.4.1.1.3.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	O	M	O
	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.3.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	M	O
	1.2.840.10008.5.1.4.1.1.3.1	RLE Lossless 1.2.840.10008.1.2.5	O	M	O
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M	M	O
	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	O	M	O
	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.12.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.12.1	RLE Lossless 1.2.840.10008.1.2.5	O	M	O
	1.2.840.10008.5.1.4.1.1.12.1	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	M	O
	1.2.840.10008.5.1.4.1.1.12.1	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	M	O
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M	M	O
	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	O	M	O
	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	O	M	O
	1.2.840.10008.5.1.4.1.1.12.2	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O	O	O
	1.2.840.10008.5.1.4.1.1.12.2	RLE Lossless 1.2.840.10008.1.2.5	O	M	O
	1.2.840.10008.5.1.4.1.1.12.2	JPEG 2000 Lossless 1.2.840.10008.1.2.4.90	O	M	O
	1.2.840.10008.5.1.4.1.1.12.2	JPEG 2000 Lossy 1.2.840.10008.1.2.4.91	O	M	O

Table 38: PRI-*SYNGO*®-CD – Supported SOP Classes

FSC, FSR, FSU – denote the requirements for those roles

O – Optional
M - Mandatory

3.4.3.2 Physical Media and Formats

The PRI-*SYNGO*®-CD Profile requires the 120mm CD-R physical media with the ISO/IEC 9660 Media Format, as defined in PS3.12.

The PRI-*SYNGO*®-MOD23 Profile requires the 130mm 2.3 GB R/W MOD physical medium with the PCDOS Media Format, as defined in PS3.12.

The PRI-*SYNGO*®-MOD41 Profile requires the 130mm 4.1 GB R/W MOD physical medium with the PCDOS Media Format, as defined in PS 3.12.

The PRI-*SYNGO*®-FD Profile requires the 1.44 MB diskette physical medium with the PCDOS Media Format, as defined in PS3.12.

3.4.3.3 Directory Information in DICOMDIR

Conforming Application Entities shall include in the DICOMDIR File the Basic Directory IOD containing Directory Records at the Patient and subsidiary levels appropriate to the SOP Classes in the File-set. All DICOM files in the File-set incorporating SOP Instances defined for the specific Application profile, shall be referenced by Directory Records.

Note: DICOMDIRs with no directory information are not allowed by this Application Profile Privately defined IODs will be referenced by "PRIVATE" Directory Records.

3.4.3.3.1 Basic Directory IOD Specialization

This Application Profile makes use of optional attributes of the Basic Directory IOD to support recognition of Patient's Storage Service request results in spanning multiple volumes (file sets). Therefore the File Set Descriptor File can be used and is then referenced by optional Basic Directory IOD attributes. If existent, the specified Descriptor File may be used by FSR applications. Any FSU, FSC shall make a clear Statement if the Descriptor File mechanism is used according to the specialization defined in this Application Profile.

The Descriptor Files shall have the following contents:

One single Line without any control-characters and according to the Basic Character-Set having the following defined text:

"MULTIVOLUME: xx of yy"

xx, yy are replaced by the actual Number of the volume (xx) and the Total Number of Volumes in the set (yy).

If used, the Descriptor File shall have the File ID "README" and reside in same directory level as the DICOMDIR. It is referenced by the attribute [0004,1141] File-set Descriptor File ID having the defined content of "README".

3.4.3.3.2 Additional Keys

File-set Creators and Updaters are required to generate the mandatory elements specified in PS 3.3, Annex F of the DICOM Standard. Table below: PRI-*SYNGO*®-CD Additional DICOMDIR Keys specifies the additional associated keys. At each directory record level other additional data elements can be added, but it is not required that File Set Readers be able to use them as keys. Refer to the Basic Directory IOD in PS 3.3.

Key Attribute	Tag	Directory Record Level	Type	Notes
Date of Birth	(0010,0030)	PATIENT	2C	required, if present in SOP Instance
Patient's Sex	(0010,0040)	PATIENT	2C	required, if present in SOP Instance
Series Date	(0008,0021)	SERIES	3	
Series Time	(0008,0031)	SERIES	3	
Institute Name	(0008,0080)	SERIES	2C	required, if present in SOP Instance
Institution Address	(0008,0081)	SERIES	2C	required, if present in SOP Instance
Series Description	(0008,103E)	SERIES	3	
Performing Physician's Name	(0008,1050)	SERIES	2C	required, if present in SOP Instance
Image Type	(0008,0008)	IMAGE	1C	required, if present in SOP Instance
SOP Class UID	(0008,0016)	IMAGE	3	
SOP Instance UID	(0008,0018)	IMAGE	3	
Image Date	(0008,0023)	IMAGE	3	
Image Time	(0008,0033)	IMAGE	3	
Referenced Image Sequence	(0008,1140)	IMAGE	1C	required, if present in SOP Instance
> Referenced SOP Class UID	(0008,1150)			
> Referenced SOP Instance UID	(0008,1155)			
Image Position (Patient)	(0020,0032)	IMAGE	2C	required, if present in SOP Instance
Image Orientation (Patient)	(0020,0037)	IMAGE	2C	required, if present in SOP Instance
Frame of Reference UID	(0020,0052)	IMAGE	2C	required, if present in SOP Instance
Rows	(0028,0010)	IMAGE	3	
Columns	(0028,0011)	IMAGE	3	
Pixel Spacing	(0028,0030)	IMAGE	1C	required, if present in SOP Instance
Calibration Image	(0050,0004)	IMAGE	2C	required, if present in SOP Instance
Icon Image Sequence	(0088,0200)	IMAGE	3	required for Image SOP Classes
> Samples per Pixel	(0028,0002)			1
> Photometric Interpretation	(0028,0004)			MONOCHROME2
> Rows	(0028,0010)			128 for XA, 64 for others
> Columns	(0028,0011)			128 for XA, 64 for others
> Bits Allocated	(0028,0100)			8
> Bits Stored	(0028,0101)			8
> High Bit	(0028,0102)			7
> Pixel Representation	(0028,0103)			0
> Pixel Data	(7FE0,0010)			Icon Image
Curve Number	(0020,0024)	CURVE	1C	required, if present in SOP Instance

Table 39: PRI-*SYNGO*®-CD Additional DICOMDIR Keys

3.4.3.3.3 Private Directory Record Keys

Private Directory Records are supported by this Application Profile Class at the following Level - IMAGE. The PRIVATE Directory Records will have required elements in addition to the mandatory elements specified in PS 3.3.

The following table will list the additional required keys for PRIVATE Directory Records:

Key Attribute	Tag	Directory Record Level	Type	Notes
Private Record UID	(0004,1432)	PRIVATE	1	See Conformance Statement
SOP Class UID	(0008,0016)	PRIVATE	1C	required, if present in SOP Instance
SOP Instance UID	(0008,0018)	PRIVATE	1C	required, if present in SOP Instance
Image Type	(0008,0008)	PRIVATE	3	
Acquisition Date	(0008,0022)	PRIVATE	3	
Acquisition Time	(0008,0032)	PRIVATE	3	
Acquisition Number	(0020,0012)	PRIVATE	3	
CSA Data Type	(0029,xx08)	PRIVATE	1	private owner code = SIEMENS CSA NON-IMAGE
CSA Data Version	(0029,xx09)	PRIVATE	3	private owner code = SIEMENS CSA NON-IMAGE

Table 40: PRI-*SYNGO*®-CD additional keys for Private Directory Records

3.4.3.3.4 Icon Images

Directory Records of type SERIES or IMAGE may include Icon Images. The Icon Image pixel data shall be as specified in PS 3.3 “Icon Image Key Definition”, and restricted such, that Bits Allocated (0028,0100) and Bits Stored (0028,0101) shall be equal 8, and Rows (0028,0010) and Columns (0028,0011) shall be equal to 128 for XA Images and 64 for all other Images. The Photometric Interpretation (0028,0004) shall always be restricted to “MONOCHROME2”.

PRIVATE Directory Records will not contain Icon Image information.

3.4.3.4 Other Parameters

This section defines other parameters common to all specific Application Profiles in the PRI-*SYNGO*® class which need to be specified in order to ensure interoperable media interchange.

3.4.3.4.1 Multi-Frame JPEG Format

The JPEG encoding of pixel data shall use Interchange Format (with table specification) for all frames.

3.4.3.4.2 Attribute Value Precedence

The values of attributes contained in a Detached Patient Management SOP Instance referenced by a DICOMDIR PATIENT Directory Record shall take precedence over the values of those attributes contained in the SOP Instance referenced by a subsidiary Directory Record. The DICOMDIR Directory Records shall have key attribute values in accordance with this precedence.

Note: This allows patient identification and demographic information to be updated without changing the composite Image IOD files. The DICOMDIR file thus is critical in establishing the link between the updated information and the image. As an example, at the time an Image file was written, the patient's name therein was incorrect, or inconsistent with the Hospital Information System records. Subsequently, a Detached Patient Management file with the corrected name is added to the file-set. The FSR should use the name from the Patient File rather than in the Image File.

3.5 Media Configuration

3.5.1 AE Title/Presentation Address Mapping

3.5.1.1 DICOM Media Storage AE Title

The application provides the application entity title:

- CsaImageManager

4 Support of Character Sets

4.1 Character Sets for *syngo*® Studio Workplace

The ***syngo*® Studio Workplaces** support the ISO 8859 Latin 1 (ISO-IR 100) character set.

When there is a mismatch between the “Specific Character Set” (0008,0005) and the characters in an IOD received by the system, then the following measures are taken to make the characters DICOM conform:

- Try to import with ISO_IR 100.
- If ISO_IR 100 fails, convert each illegal character to a '?'.

5 Extensions / Specializations / Privatizations

5.1 Standard Extended / Specialized / Private SOPs

Not applicable.

5.2 Private Transfer Syntaxes

Not applicable.