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# MRease

## DICOM Conformance Statement

### Part I - Network



# 1 Introduction

## 1.1 Purpose

This DICOM Conformance Statement is written according to part PS 3.2 of [1].

The applications described in this conformance statement are the SIEMENS MR products using software Syngo MR 2002B. The MR DICOM network implementation acts as SCU and SCP for the DICOM Storage and Storage Commitment, as SCU and SCP for the Query/Retrieve service and as SCU for the DICOM Basic Print, Modality Worklist and Modality Performed Procedure Step service.

## 1.2 Scope

This DICOM Conformance Statement refers to SIEMENS MR products using software Syngo MR 2002B. The following table relates Syngo MR 2002B software names to SIEMENS MR products.

*Table 1: Siemens MR DICOM Products*

Software Name	SIEMENS MR Product
Syngo MR 2002B	Magnetom Symphony
Syngo MR 2002B	Magnetom Harmony
Syngo MR 2002B	Magnetom Concerto
Syngo MR 2002B	Magnetom Sonata
Syngo MR 2002B	Magnetom Allegra
Syngo MR 2002B	Magnetom Trio

## 1.3 Definitions, Abbreviations

### 1.3.1 Definitions

DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DICOM Message Service Element with Composite information objects

### 1.3.2 Abbreviations

ACR	American College of Radiology
AE	DICOM Application Entity

ASCII	American Standard Code for Information Interchange
HIS	Hospital Information System
IOD	DICOM Information Object Definition
ISO	International Standard Organisation
R	Required Key Attribute
NEMA	National Electrical Manufacturers Association
O	Optional Key Attribute
RIS	Radiology Information System
PDU	DICOM Protocol Data Unit
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM server)
SOP	DICOM Service-Object Pair
U	Unique Key Attribute

## 1.4 References

- [1] Digital Imaging and Communications in Medicine (DICOM) 3.0, NEMA PS 3.1-16, 2001

## 1.5 Connectivity and Interoperability

The implementation of the Siemens DICOM interface has been carefully tested to assure correspondence with this Conformance Statement. But the Conformance Statement and the DICOM standard does not guarantee interoperability of Siemens modalities and modalities of other vendors. The user must compare the relevant Conformance Statements and if a successful interconnection should be possible, the user is responsible to specify an appropriate test suite and to validate the interoperability, which is required. A network environment may need additional functions out of the scope of DICOM.

## 2 Implementation Model Storage

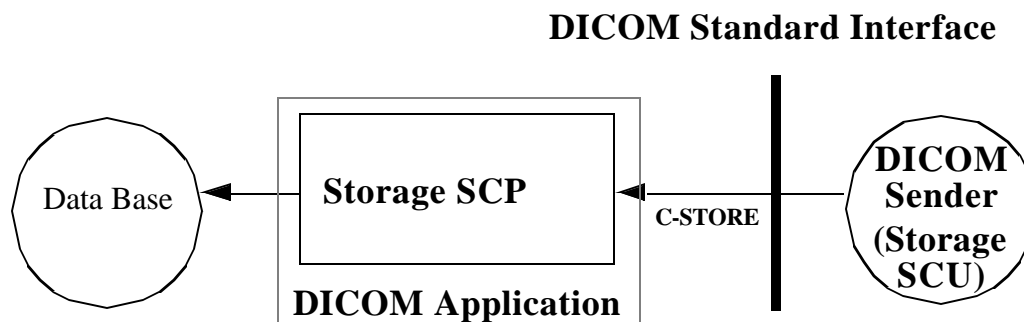
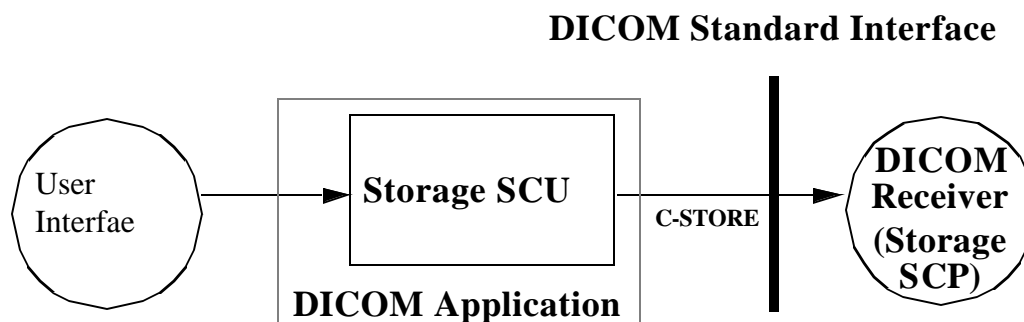
The Siemens MR DICOM Application Entity originates associations for Storage of DICOM Composite Information Objects in Remote Application Entities.

### 2.1 Application Data Flow Diagram

The MRease DICOM network implementation is a Windows NT application and acts as SCU and SCP for the C-Store DICOM network service.

These applications are started automatically and will be invoked via network.

The DICOM send service will be activated through the Patient Browser platform.



### 2.2 Functional Definitions of Application Entities

All components of the Siemens MR DICOM Storage SCP application are operating as background daemon processes. They are existing, when the machine is powered on and waiting for tasks.

## 2.3 Sequencing of Real-World Activities

The MR acquisition system obtains DICOM Worklist information regarding scheduled procedures from HIS/RIS and includes this information in the series of the acquired DICOM MR images. If the DICOM Worklist information is not available from HIS/RIS it will be typed by user during the registration of the patient.

## 2.4 Storage AE Specification

Siemens DICOM products provide Standard Conformance to the following DICOM V3.0 SOP Classes as both an SCU and SCP:

*Table 2: Standard SOP Classes as an Storage SCU and an SCP*

SOP Class Name	SOP Class UID
CR Image Storage	1.2.840.10008.5.1.4.1.1.1
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
US 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
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1
SC (Secondary Capture) Image Storage	1.2.840.10008.5.1.4.1.1.7
XA (X-Ray Angiographic) Image Storage	1.2.840.10008.5.1.4.1.1.12.1
XA Bi-Plane (X-Ray Angiographic Bi-Plane) Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3
XRF (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
PET Image Storage	1.2.840.10008.5.1.4.1.1.128
Verification (only SCP)	1.2.840.10008.1.1
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1
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
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
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
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3

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Siemens DICOM products provide Private Conformance to the following DICOM V3.0 conform Private SOP Classes as both an SCU and SCP:

*Table 3: Private SOP Classes as an Storage SCU and an SCP*

SOP Class Name	SOP Class UID
CSA Non-Image Storage	1.3.12.2.1107.5.9.1

## 2.4.1 Association Establishment Policies

### 2.4.1.1 General

The configuration of the Siemens DICOM application defines the Application Entity Titles, the port numbers and of course the host name and net address.

### 2.4.1.2 Number of Associations

The Siemens DICOM application initiates several associations at a time, one for each transfer request being processed.

### 2.4.1.3 Asynchronous Nature

The Siemens DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

### 2.4.1.4 Implementation Identifying Information

The Siemens MR DICOM software provides a single Implementation Class UID of

- "1.3.12.2.1107.5.2"

and an Implementation Version Name of

- "MR\_2002B\_VA21A".

### 2.4.1.5 Maximum PDU Size offered

- The maximum PDU size offered by syngo is configurable with default set to 28672 Bytes

### 2.4.1.6 Dicom Application Context

- Dicom Application context name: 1.2.840.10008.3.1.1.1

## 2.4.2 Association Initiation by Real-World Activity

The Siemens DICOM application attempts to initiate a new association for

- DIMSE C-STORE service operations.

## 2.4.2.1 Real-World Activity - Storage SCU

### 2.4.2.1.1 Associated Real-World Activity - Storage SCU

The associated Real-World activities are:

- a user wants to send one or more composite objects to a remote node.
- The local C-MOVE SCP initiates C-STORE suboperations as a reaction to a C-MOVE-RQ coming from a remote node.

For both cases, if the process successfully establishes an association to a remote Application Entity, it will transfer each image one after another via the open association. If the C-STORE Response from the remote Application contains an error status the association is aborted or released.

### 2.4.2.1.2 Proposed Presentation Contexts - Storage SCU

The Siemens DICOM application will propose Presentation Contexts as shown in the following table. Not all the listed transfer syntaxes will be proposed, please see the discussion after the table for the actual proposed transfer syntaxes.

**Table 4:** Initiation presentation context Storage

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
CR Image Storage SOP class	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
CT Image Storage SOP class	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
MR Image Storage SOP class	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
NM Image Storage SOP class	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

**Table 4:** Initiation presentation context Storage

SC Image Storage SOP class	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
XA Image Storage SOP class	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
XA Bi-Plane Image Storage SOP class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
XRF Image Storage SOP class	1.2.840.10008.5.1.4.1.1.12.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
US MF Image Storage SOP class	1.2.840.10008.5.1.4.1.1.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
US Image Storage SOP class	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
PET Image Storage SOP class	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Waveform Storage SOP classes	1.2.840.10008.5.1.4.1.1.9.1.1 1.2.840.10008.5.1.4.1.1.9.1.2 1.2.840.10008.5.1.4.1.1.9.1.3 1.2.840.10008.5.1.4.1.1.9.2.1 1.2.840.10008.5.1.4.1.1.9.3.1 1.2.840.10008.5.1.4.1.1.9.4.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Digital X-Ray Image Storage SOP class	1.2.840.10008.5.1.4.1.1.1.1.1 1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Digital Mammography X-Ray Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.1.2.1 1.2.840.10008.5.1.4.1.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

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**Table 4:** Initiation presentation context Storage

Standard RT Struc- ture set Stor- age SOP class	1.2.840.10008.5. 1.4.1.1.481.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
CSA Non-Im- age Storage SOP class	1.3.12.2.1107.5.9.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

The transfer syntax is configurable to allow only Implicit Little Endian for instance.

### 2.4.2.1.3 SOP Specific Conformance Statement - Storage SCU

The DICOM images created by Siemens DICOM application conform to the DICOM IOD definitions (Standard extended IODs). But they will contain additional private elements which have to be discarded by a DICOM system when modifying the image.

When performing a save for a new operation, all non defined syngo attributes will be deleted. For association and DIMSE level time outs refer sec. 6.2

### Image Pixel Attribute Description for Grayscale Images

The Siemens DICOM application supports the MONOCHROME1 and MONOCHROME2 photometric interpretation pixel format and graphic overlay with unsigned integer and 8 or 16 bits allocated. Possible values:

#### Pixel plane

- samples per pixel (attribute 0028, 0002) = 1
- photometric interpretation (attribute 0028,0004) = “MONOCHROME1”
- photometric interpretation (attribute 0028,0004) = “MONOCHROME2”
- pixel representation (attribute 0028, 0103) = 0
- bits allocated (attribute 0028, 0100) = 8, 16
- bits stored (attribute 0028,0101) = 8, 10, 12
- high bit (attribute 0028,0102) = 7, 9, 11

#### Overlay plane

- overlay type (attribute 60xx, 0040) = “G”
- overlay bits allocated (attribute 60xx, 0100) = 16
- overlay bit position (attribute 60xx, 0102) = 12, 13, 14, 15

#### Overlay plane

- overlay type (attribute 60xx, 0040) = “G”
- overlay bits allocated (attribute 60xx, 0100) = 1

- overlay bit position (attribute 60xx, 0102) = 0
- overlay data (attribute 60xx, 3000) = supported.

The Siemens DICOM application sends also the MONOCHROME1 and MONOCHROME2 photometric interpretation pixel format with binary 2's complement integer and 16 bits allocated. Possible values:

#### **Pixel plane**

- samples per pixel (attribute 0028, 0002) = 1
- photometric interpretation (attribute 0028,0004) = "MONOCHROME1"
- photometric interpretation (attribute 0028,0004) = "MONOCHROME2"
- pixel representation (attribute 0028, 0103) = 1
- bits allocated (attribute 0028, 0100) = 16
- bits stored (attribute 0028,0101) = 16
- high bit (attribute 0028,0102) = 15

#### **Overlay plane**

- overlay type (attribute 60xx, 0040) = "G"
- overlay bits allocated (attribute 60xx, 0100) = 1
- overlay bit position (attribute 60xx, 0102) = 0
- overlay data (attribute 60xx, 3000) = supported.

#### **Image Pixel Attribute Description for Color Images**

The Siemens DICOM application supports the RGB color image description with the unsigned integer 24 bit color image plane pixel format:

- samples per pixel (attribute 0028, 0002) = 3
- photometric interpretation (attribute 0028,0004) = "RGB"
- pixel representation (attribute 0028, 0103) = 0
- bits allocated (attribute 0028, 0100) = 8
- bits stored (attribute 0028,0101) = 8
- high bit (attribute 0028,0102) = 7
- planar configuration (attribute 0028,0006) = 0.

The Siemens DICOM application supports the "Palette Color" color image description with unsigned integer and 2's complement pixel format:

- samples per pixel (attribute 0028, 0002) = 1
- photometric interpretation (attribute 0028,0004) = "PALETTE COLOR"
- pixel representation (attribute 0028, 0103) = 0

- bits allocated (attribute 0028, 0100) = 8, 16
- bits stored (attribute 0028,0101) = 8, 16
- high bit (attribute 0028,0102) = 7, 15

Both 8bit and 16bit palettes are supported - but no Segmented Palette Color LUTs.

## 2.4.3 Association Acceptance Policy

The Siemens DICOM application attempts to accept a new association for

- DIMSE C-ECHO
- DIMSE C-STORE

service operations.

### 2.4.3.1 Real-World Activity - Storage SCP

#### 2.4.3.1.1 Associated Real-World Activity - Storage SCP

The daemon receiving process will accept an association and will receive any images transmitted on that association and will store the images on disk in the own data base.

#### 2.4.3.1.2 Accepted Presentation Contexts - Storage SCP

The Siemens DICOM application will propose Presentation Contexts as shown in the following table:

*Table 5: Acceptable presentation contexts Storage*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
CR Image Storage SOP class	1.2.840.10008.5.1.	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
	4.1.1.1	Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		

**Table 5: Acceptable presentation contexts Storage**

CT Image Storage SOP class	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		
MR Image Storage SOP class	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		
NM Image Storage SOP class	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		
SC Image Storage SOP class	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		
XA Image Storage SOP class	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		
XA Bi-Plane Image Storage SOP class (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		

**Table 5: Acceptable presentation contexts Storage**

XRF Image Storage SOP class	1.2.840.10008.5.1.4.1.1.12.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		
US MF Image Storage SOP class	1.2.840.10008.5.1.4.1.1.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		
US Image Storage SOP class	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		
PET Image Storage SOP class	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		
Waveform Storage SOP classes	1.2.840.10008.5.1.4.1.1.9.1.1 1.2.840.10008.5.1.4.1.1.9.1.2 1.2.840.10008.5.1.4.1.1.9.1.3 1.2.840.10008.5.1.4.1.1.9.2.1 1.2.840.10008.5.1.4.1.1.9.3.1 1.2.840.10008.5.1.4.1.1.9.4.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

**Table 5: Acceptable presentation contexts Storage**

Digital X-Ray ImageStorage SOP class	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		
Digital Mammography X-Ray Image Storage SOP class	1.2.840.10008.5.1.4.1.1.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline	1.2.840.10008.1.2.4.50		
		JPEG Extended (2 & 4)	1.2.840.10008.1.2.4.51		
		JPEG Lossless Non-hierarchical	1.2.840.10008.1.2.4.70		
Standard RT Structure set Storage SOP class	1.2.840.10008.5.1.4.1.1.481.3	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
CSA Non-Image Storage SOP class	1.3.12.2.1107.5.9.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

### 2.4.3.1.3 SOP Specific Conformance Statement - Storage SCP

The Siemens DICOM application conforms to the Full Storage Service Class at Level 2 - with the exception that private Sequences (private elements with VR=SQ) are not supported in Explicit VR Transfer syntax and will be ignored. When private Sequences are received in implicit VR then the whole sequence is stored as one binary element of VR=OW.

In the event of a successful C-STORE operation, the image has successfully been written on disk in the Siemens CSA image format.

The DICOM receiver returns the status Success upon successful operation otherwise one of the following status codes is returned and the association is aborted:

- Refused (A700):  
This error status indicates a lack of Resources (e.g. not enough disk space) on the <xxx> modality.
- Error (A900 or C000):  
An error occurred while processing the image which makes it impossible to proceed. The image will not be stored and the association aborted.

If an image with the same SOP Instance UID (as that image being received) is already present in the database then the received image will be ignored. So if a remote node sends twice the same image (same SOP Instance UID) then there will still be only one image (the first) in the database of the DICOM receiver.

**The Siemens DICOM receiver can receive all kinds of different image formats. But for Display of such images the following restrictions apply:**

### **Image Pixel Attribute Display Criterion for Grayscale Images**

The Display application accepts the MONOCHROME1 and MONOCHROME2 photometric interpretation pixel format and graphic overlay with unsigned integer and 8 or 16 bits allocated. Accepted values:

#### **Pixel plane**

- samples per pixel (attribute 0028, 0002) = 1
- photometric interpretation (attribute 0028,0004) = “MONOCHROME1”
- photometric interpretation (attribute 0028,0004) = “MONOCHROME2”
- pixel representation (attribute 0028, 0103) = 0 (unsigned)
- bits allocated (attribute 0028, 0100) = 8, 16
- bits stored (attribute 0028,0101) = 8, 10, 12 (in case of 16 bits allocated, 8 bits stored is not allowed)
- high bit (attribute 0028,0102) = bits stored - 1
- only aspect ratio 1:1 is allowed

#### **Overlay plane**

- overlay type (attribute 60xx, 0040) = “G”
- overlay bits allocated (attribute 60xx, 0100) = 16
- overlay bit position (attribute 60xx, 0102) = 12, 13, 14, 15 (only bits above high bit are allowed)

#### **Overlay plane**

- overlay type (attribute 60xx, 0040) = “G”
- overlay bits allocated (attribute 60xx, 0100) = 1
- overlay bit position (attribute 60xx, 0102) = 0
- overlay data (attribute 60xx, 3000) = supported.

The Siemens DICOM application accepts also the MONOCHROME1 and MONOCHROME2 photometric interpretation pixel format with binary 2's complement integer and 16 bits allocated. Accepted values:

#### **Pixel plane**

- samples per pixel (attribute 0028, 0002) = 1

- photometric interpretation (attribute 0028,0004) = “MONOCHROME1”
- photometric interpretation (attribute 0028,0004) = “MONOCHROME2”
- pixel representation (attribute 0028, 0103) = 1 (signed)
- bits allocated (attribute 0028, 0100) = 16
- bits stored (attribute 0028,0101) = 16
- high bit (attribute 0028,0102) = 15
- only aspect ratio 1:1 is allowed

### Overlay plane

- overlay type (attribute 60xx, 0040) = “G”
- overlay bits allocated (attribute 60xx, 0100) = 1
- overlay bit position (attribute 60xx, 0102) = 0
- overlay data (attribute 60xx, 3000) = supported.

For MOD LUT both the linear LUT (Rescale Slope/Intercept) and the MOD LUT SQ are supported and considered when pixel data is displayed. However the following limitations apply:

- The MOD LUT SQ will be ignored for 8 bit signed pixels.
- The pixel format is not changed by applying the MOD LUT SQ, even if the output range of the LUT is larger than the input range.(e.g. 8 bit -> 16 bit).
- If the MOD LUT SQ contains multiple LUTs then only the first one is used.

For VOI LUT also both the linear LUT (Window Center/Width) and the VOI LUT SQ are supported (VOI LUT SQ with 8 or 16 bit LUT data).

In this version the Display application supports only rectangular and circular Shutters, one of each per image. Images with other shutter types will be displayed without Shutter.

### Image Pixel Attribute Acceptance Criterion for Color Images

The Siemens Display application supports the RGB color image description with the unsigned integer 24 bit color image plane pixel format. Accepted values:

- samples per pixel (attribute 0028, 0002) = 3
- photometric interpretation (attribute 0028,0004) = “RGB”
- pixel representation (attribute 0028, 0103) = 0
- bits allocated (attribute 0028, 0100) = 8
- bits stored (attribute 0028,0101) = 8
- high bit (attribute 0028,0102) = 7
- planar configuration (attribute 0028,0006) = 0 (pixel interleave)

- only aspect ratio 1:1 is allowed for Pixel Aspect Ratio, and Pixel Spacing must be the same for both directions.

The Siemens DICOM application supports the “Palette Color” color image description with unsigned integer and 2’s complement pixel format:

- samples per pixel (attribute 0028, 0002) = 1
- photometric interpretation (attribute 0028,0004) = “PALETTE COLOR”
- pixel representation (attribute 0028, 0103) = 0
- bits allocated (attribute 0028, 0100) = 8 and bits stored (attribute 0028,0101) = 8
- bits allocated (attribute 0028, 0100) = 16 and bits stored (attribute 0028,0101) = 16
- high bit (attribute 0028,0102) = 7, 15

Both 8bit and 16bit palettes are supported - but no Segmented Palette Color LUTs.

#### **2.4.3.1.4 Presentation Context Acceptance Criterion - Storage SCP**

The Siemens DICOM application will accept any number of verification or storage SOP classes that are listed above. In the event that the Siemens DICOM application runs out of resources, it will reject the association request.

#### **2.4.3.1.5 Transfer Syntax Selection Policies - Storage SCP**

The Siemens DICOM application supports

- the Implicit VR Little Endian, the Explicit VR Little Endian and Explicit VR Big Endian transfer syntaxes
- the JPEG Baseline and JPEG Extended transfer syntaxes (JPEG lossy).
- the JPEG Lossless Non-hierarchical transfer syntax.

Any proposed presentation context which includes one of these transfer syntaxes will be accepted Any proposed presentation context that does not include one of these transfer syntaxes will be rejected.

The order of preference in accepting a Transfer syntax is:

1. JPEG Extended Process 2 And 4.
2. JPEG Lossless Non-hierarchical
3. JPEG Baseline
4. Explicit VR Little Endian
5. Explicit VR Big Endian
6. Implicit VR Little Endian

## 2.4.4 Performed MR Image IOD Attributes

### Patient Module

Attribute Name	Tag	Supported Values
Patient's Name	0010,0010	set by registration or worklist; used for image annotation
Patient ID	0010,0020	set by registration or worklist; used for image annotation
Patient's Birth Date	0010,0030	set by registration or worklist; used for image annotation
Patient's Sex	0010,0040	set by registration or worklist
Patient Comments	0010,4000	set by registration

### General Study Module

Attribute Name	Tag	Supported Values
Study Instance UID	0020,000D	set by internal data base or worklist
Study Date	0008,0020	set by acquisition
Study Time	0008,0030	set by acquisition
Referring Physician's Name	0008,0090	set by registration or worklist
Study ID	0020,0010	set by internal data base; used for image annotation
Accession Number	0008,0050	set by registration or worklist
Study Description	0008,1030	set by registration user interface
Physician(s) of Record	0008,1048	set by acquisition user interface
Name of Physician(s) Reading Study	0008,1060	set by acquisition user interface
Referenced Study Sequence	0008,1110	set by worklist
> Referenced SOP Class UID	0008,1150	set by worklist
> Referenced SOP Instance UID	0008,1155	set by worklist

Attribute Name	Tag	Supported Values
Procedure Code Sequence	0008,1032	set by worklist
> Code Value	0008,0100	set by worklist
> Code Scheme Designator	0008,0102	set by worklist
> Code Meaning	0008,0104	set by worklist

### Patient Study Module

Attribute Name	Tag	Supported Values
Admitting Diagnoses Description	0008,1080	set by acquisition user interface
Patient's Age	0010,1010	set by registration or worklist
Patient's Size	0010,1020	set by registration or worklist
Patient's Weight	0010,1030	set by registration or worklist

### General Series Module

Attribute Name	Tag	Supported Values
Modality	0008,0060	MR
Series Instance UID	0020,000E	set by internal data base
Series Number	0020,0011	set by internal data base; used for image annotation
Series Date	0008,0021	set by acquisition
Series Time	0008,0031	set by acquisition
Performing Physicians' Name	0008,1050	set by registration user interface
Protocol Name	0018,1030	set by acquisition
Series Description	0008,103E	set by acquisition
Operators' Name	0008,1070	set by registration user interface

Attribute Name	Tag	Supported Values
Referenced Study Component Sequence	0008,1111	identifies Modality Performed Procedure Step related to the series
> Referenced SOP Class UID		identifies Modality Performed SOP Class related to the series
> Referenced SOP Instance UID		identifies Modality Performed SOP Instance UID related to the series
Body Part Examined	0018,0015	set by acquisition user interface
Patient Position	0018,5100	set by registration user interface; used for image annotation
Request Attributes Sequence	0040,0275	set by worklist (not available with all postprocessing applications)
> Requested Procedure ID	0040,1001	set by worklist (not available with all postprocessing applications)
> Scheduled Procedure Step ID	0040,0009	set by worklist (not available with all postprocessing applications)
> Scheduled Procedure Step Description	0040,0007	set by worklist (not available with all postprocessing applications)
> Scheduled Action Item Code Sequence	0040,0008	set by worklist (not available with all postprocessing applications)
> Code Value	0008,0100	set by worklist (not available with all postprocessing applications)
> Code Scheme Designator	0008,0102	set by worklist (not available with all postprocessing applications)
> Code Meaning	0008,0104	set by worklist (not available with all postprocessing applications)
Performed Procedure Step ID	0040,0253	copied from scheduled procedure step id (not available with all postprocessing applications)

Attribute Name	Tag	Supported Values
Performed Procedure Step Start Date	0040,0244	set by acquisition (not available with all postprocessing applications)
Performed Procedure Step Start Time	0040,0245	set by acquisition (not available with all postprocessing applications)
Performed Procedure Step Description	0040,0254	copied from scheduled procedure step description (not available with all postprocessing applications)

### Frame of Reference Module

Attribute Name	Tag	Supported Values
Frame of Reference UID	0020,0052	set by acquisition
Position Reference Indicator	0020,1040	set by acquisition

### General Equipment Module

Attribute Name	Tag	Supported Values
Manufacturer	0008,0070	SIEMENS
Institution Name	0008,0080	set by configuration; used for image annotation
Institution Address	0008,0081	Street number, Street, City, District, Zip Code, Country
Station Name	0008,1010	hostname; set by configuration
Manufacturer's Model Name	0008,1090	MAGNETOM xxx; used for image annotation
Device Serial Number	0018,1000	set by configuration

Attribute Name	Tag	Supported Values
Software Versions	0018,1020	used for image annotation
Date of Last Calibration	0018,1200	set by configuration
Time of Last Calibration	0018,1201	set by configuration

### General Image Module

Attribute Name	Tag	Supported Values
Image Number	0020,0013	set by internal data base; used for image annotation
Image Date	0008,0023	set by acquisition
Image Time	0008,0033	set by acquisition
Image Type	0008,0008	set by acquisition
Acquisition Number	0020,0012	set by acquisition
Acquisition Date	0008,0022	set by acquisition; used for image annotation
Acquisition Time	0008,0032	set by acquisition; used for image annotation
Referenced Image Sequence	0008,1140	set by Graphical Slice Position
> Referenced SOP Class UID	0008,1150	set by Graphical Slice Position
> Referenced SOP Instance UID	0008,1155	set by Graphical Slice Position
Derivation Description	0008,2111	set by applications which derive images
Source Image Sequence	0008,2112	set by applications which derive images
> Referenced SOP Class UID	0008,1150	set by applications which derive images
> Referenced SOP Instance UID	0008,1155	set by applications which derive images
Image Comments	0020,4000	set by registration and acquisition user interface; used for image annotation

## Image Plane Module

Attribute Name	Tag	Supported Values
Pixel Spacing	0028,0030	set by acquisition
Image Orientation	0020,0037	set by acquisition; used for image annotation
Image Position	0020,0032	set by acquisition; used for image annotation
Slice Thickness	0018,0050	set by acquisition; used for image annotation
Slice Location	0020,1041	set by acquisition; accumulated from image orientation and image position and used as term SP in the image annotation

## Image Pixel Module

Attribute Name	Tag	Supported Values
Samples per Pixel	0028,0002	1
Photometric Interpretation	0028,0004	MONOCHROME2
Rows	0028,0010	set by acquisition
Columns	0028,0011	set by acquisition
Bits Allocated	0028,0100	16
Bits Stored	0028,0101	12
High Bit	0028,0102	11
Pixel Representation	0028,0103	0
Pixel Data	7FE0,0010	set by acquisition
Smallest Image Pixel Value	0028,0106	set by acquisition
Largest Image Pixel Value	0028,0107	set by acquisition

### Contrast/Bolus Module

Attribute Name	Tag	Supported Values
Contrast/Bolus Agent	0018,0010	set by acquisition contrast user interface; used for image annotation
Contrast/Bolus Agent Sequence	0018,0012	set by acquisition contrast user interface
> Code Value	0008,0100	set by acquisition contrast user interface
> Code Scheme Designator	0008,0102	99SDM
Contrast/Bolus Volume	0018,1041	set by acquisition contrast user interface.
Contrast/Bolus Total Dose	0018,1044	set by acquisition contrast user interface.
Contrast Flow Duration(s)	0018,1047	set by acquisition contrast user interface.
Contrast/Bolus Ingredient	0018,1048	set by acquisition contrast user interface. Defined Terms: IODINE GADOLINIUM CARBON DIOXIDE BARIUM
Contrast/Bolus Ingredient Concentration	0018,1049	set by acquisition contrast user interface.

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### MR Image Module

Attribute Name	Tag	Supported Values
Image Type	0008,0008	set by acquisition/applications; used for image annotation
Samples per Pixel	0028,0002	1
Photometric Interpretation	0028,0004	MONOCHROME2
Bits Allocated	0028,0100	16

<b>Attribute Name</b>	<b>Tag</b>	<b>Supported Values</b>
Scanning Sequence	0018,0020	set by acquisition
Sequence Variant	0018,0021	set by acquisition
Scan Options	0018,0022	set by acquisition; used for image annotation
MR Acquisition Type	0018,0023	set by acquisition
Repetition Time	0018,0080	set by acquisition; used for image annotation
Echo Time	0018,0081	set by acquisition; used for image annotation
Echo Train Length	0018,0091	set by acquisition
Inversion Time	0018,0082	set by acquisition; used for image annotation
Trigger Time	0018,1060	set by acquisition; used for image annotation
Sequence Name	0018,0024	set by acquisition; used for image annotation
Angio Flag	0018,0025	set by acquisition
Number of Averages	0018,0083	set by acquisition
Imaging Frequency	0018,0084	set by acquisition
Imaged Nucleus	0018,0085	set by acquisition
Echo Number	0018,0086	set by acquisition
Magnetic Field Strength	0018,0087	set by acquisition
Spacing Between Slices	0018,0088	set by acquisition
Number of Phase Encoding Steps	0018,0089	set by acquisition
Percent Sampling	0018,0093	set by acquisition
Percent Phase Field of View	0018,0094	set by acquisition
Pixel Bandwidth	0018,0095	set by acquisition
Nominal Interval	0018,1062	set by ECG acquisitions
Cardiac Number of Images	0018,1090	set by ECG acquisitions
Transmitting Coil	0018,1251	set by acquisition
Acquisition Matrix	0018,1310	set by acquisition

Attribute Name	Tag	Supported Values
Phase Encoding Direction	0018,1312	set by acquisition
Flip Angle	0018,1314	set by acquisition; used for image annotation
SAR	0018,1316	set by acquisition
Variable Flip Angle Flag	0018,1315	N
db/dt	0018,1318	set by acquisition

### VOI LUT Module

Attribute Name	Tag	Supported Values
Window Center	0028,1050	set by acquisition; used for image annotation
Window Width	0028,1051	set by acquisition; used for image annotation
Window Center & Width Explanation	0028,1055	set by acquisition

### SOP Common Module

Attribute Name	Tag	Supported Values
SOP Class UID	0008,0016	MR Storage SOP Class UID
SOP Instance UID	0008,0018	set by internal data base
Specific Character Set	0008,0005	set by configuration

---

## 2.4.5 Performed MR Image Pixel Attribute Description

The Siemens MR DICOM applications create the monochrome 2 photometric interpretation with the unsigned integer 16 bit gray scale pixel and graphic overlay format. The lower 12 bits are used for pixel and the higher 4 bits or the overlay data attribute is used for the graphic overlay bitmaps:

### Pixel plane

- + samples per pixel (attribute 0028, 0002) = 1
- + photometric interpretation (attribute 0028,0004) = "MONOCHROME2"
- + pixel representation (attribute 0028, 0103) = 0
- + bits allocated (attribute 0028, 0100) = 16
- + bits stored (attribute 0028,0101) = 12
- + high bit (attribute 0028,0102 ) = 11

### Overlay plane

- + rows (attribute 60xx, 0010) = same as attribute 0028, 0010
- + columns (attribute 60xx, 0011) = same as attribute 0028, 0011
- + overlay type (attribute 60xx, 0040) = "G"
- + origin (attribute 60xx, 0050) = 1,1
- + bits allocated (attribute 60xx, 0100) = 16
- + bit position (attribute 60xx, 0102) = 12
- + overlay data (attribute 60xx, 3000) = supported.

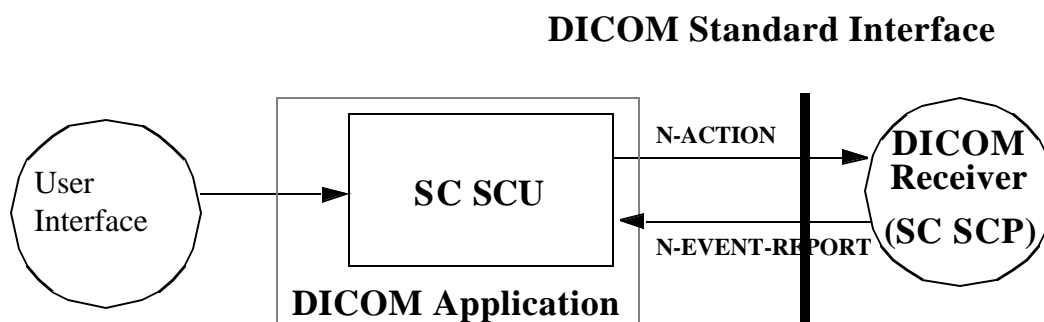
## 3 Storage Commitment

### 3.1 Storage Commitment Push Model

The Storage Commitment service class defines an application-level class of service which facilitates the commitment to storage. It performs an additional task of commitment of images apart from the network based storage of images as defined by the Storage Service class.

#### 3.1.1 Application Data Flow Diagram

*Figure 1: Application Data Flow Diagram Storage Commitment SCU*



#### 3.1.2 Functional Definitions of Application Entities

The Storage Commitment Push Model SCU (SC-SCU) uses the Storage Commitment Service Class to get commitment for one or more images from the Storage Commitment Push Model SCP (SC-SCP). SC-SCU issues an N-ACTION to SC-SCP containing a list of references to images, requesting that the SC-SCP takes responsibility for storage commitment of the images. If the SC-SCP has determined that all the images exist and it has successfully completed storage commitment for the set of images, it issues an N-EVENT-REPORT with status successful and the list of stored images. SC-SCU now knows that the images have been committed by SC-SCP and can delete its copies of images. If committed storage cannot be done for some reason for any of the list of images the SC\_SCP issues an N-EVENT-REPORT with a status of completed-failures exist and would include both the successful and failed list. The N-EVENT\_REPORT occurs on the same or on a different association as the N-ACTION.

#### 3.1.3 Sequencing of real World Activities

not applicable.

## 3.2 Storage Commitment AE Specification

*syngo* Storage Commitment AE provide Standard Conformance to the following DICOM V3.0 SOP Classes both as SCU and as SCP.

**Table 6:** Standard SOP Classes as Storage Commitment Push Model

SOP Class Name	SOP Class UID
Storage Commitment Push Model	1.2.840.10008.1.20.1

### 3.2.1 Association Establishment Policies

#### 3.2.1.1 General

The configuration of *syngo* Storage Commitment AE defines the Application Entity Titles, the port numbers and of course the host name and net address.

#### 3.2.1.2 Number of Associations

*syngo* Storage Commitment AE initiates several association at a time, one for each storage commitment request being processed.

#### 3.2.1.3 Asynchronous Nature

*syngo* Storage Commitment AE does not support asynchronous communication (multiple outstanding transactions over a single association).

#### 3.2.1.4 Implementation Identifying Information

The Siemens DICOM software provides a single Implementation Class UID of

- “1.3.12.2.1107.5.2”

and an Implementation Version Name of

- “MR\_2002B\_VA21A”.

### 3.2.2 Association Initiation Policy

*syngo* Storage Commitment AE initiates an association in two cases: when acting as SCU, in order to send a request for storage commitment and when acting as SCP and the association on which the storage commitment request was received is not open anymore.

### 3.2.2.1 Real-World Activity - Send Storage Commitment Request

#### 3.2.2.1.1 Associated Real-World Activity - Send Storage Commitment Request

The user has sent (or archived) images to another DICOM node, which is configured as storage commitment SCP. *syngo* will automatically attempt to send a storage commitment request for this images.

#### 3.2.2.1.2 Proposed Presentation Contexts - Send Storage Commitment Request

*syngo* Storage Commitment AE will propose Presentation Contexts as shown in the following table:

*Table 7: Initiation presentation context Storage Commitment Request*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

#### 3.2.2.1.3 SOP Specific Conformance Statement - Send Storage Commitment Request

The SCU sends the N-ACTION-RQ message and waits for the N-ACTION-RSP. After receiving this, the transaction is marked as “waiting”.

Depending on a configuration value, the association will be closed or kept open. In the first case, there is another configurable value giving the number of minutes (by default 60) to wait for the corresponding N\_EVENT\_REPORT. In the second case, this time is the (also configurable) time-out for the association. For both cases, if the N\_EVENT\_REPORT does not arrive during the configured time, the transaction will be marked as failed.

If the N\_EVENT\_REPORT received has the status of "complete - failure exists", the transaction is marked as failed, else the transaction is marked as "completed"; In both cases, a message is shown to the user.

Storage Commitment is supported for all the SOP class UIDs as described in the Storage chapter.

The Referenced Study Component Sequence is not supported.

Storage Media File-Set ID and UID Attributes will not be supported in the N-ACTION primitive invoked by the Storage Commitment SCU.

### 3.2.2.2 Real World Activity - Send Storage Commitment Response

#### 3.2.2.2.1 Associated Real-World Activity - Send Storage Commitment Response

Acting as an SC-SCP, *syngo* Storage Commitment AE received an Storage Commitment request, carried out the request, and is ready to send back the response, but the association is not open anymore. In this case it will initiate an association to send the N\_EVENT\_REPORT to the SCU.

#### 3.2.2.2.2 Accepted Presentation Contexts - Send Storage Commitment Response

*syngo* Storage Commitment AE will propose Presentation Contexts as shown in the following table:

**Table 8:** Initiation presentation context Storage Commitment Response

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP class	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

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#### 3.2.2.2.3 SOP Specific Conformance Statement - Send Storage Commitment Response

Storage Media File-Set ID and UID Attributes will not be supported in the N-EVENT-REPORT primitive invoked by the Storage Commitment SCP.

### 3.2.3 Association Acceptance Policy

The *syngo* Storage Commitment AE accepts an association in two cases: when acting as SCP and an association request for Storage Commitment Push model arrives, and when acting as SCU if configured to receive N-EVENT-REPORT on a separate association.

### 3.2.3.1 Real World Activity - Receive Storage Commitment Request

#### 3.2.3.1.1 Associated Real-World Activity - Receive Storage Commitment Request

An association request arrives for *syngo* Storage Commitment Push Model.

#### 3.2.3.1.2 Accepted Presentation Contexts - Receive Storage Commitment Request

*syngo* Storage Commitment AE will accept Presentation Contexts as shown in the following table:

**Table 9:** Presentation context accepted for Storage Commitment

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP class	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

#### 3.2.3.1.3 SOP Specific Conformance Statement - Receive Storage Commitment Request

##### <to be adjusted by divisions:

*syngo* Storage Commitment AE can be configured to run on an archive system.

If the *syngo* Storage Commitment AE is running on an archive system, it will interact with this archive system in order to commit the storage of images and will send back to the SCU the result of the operation.

If not running on an archive node, *syngo* Storage Commitment AE will return success for images that are stored in the local database and failure for images that are not.>

Storage Media File-Set ID and UID Attributes will not be supported in the N-EVENT-REPORT primitive invoked by the Storage Commitment SCP.

### 3.2.3.2 Real World Activity - Receive Storage Commitment Response

#### 3.2.3.2.1 Associated Real World Activity - Receive Storage Commitment

## Response

*syngo* Storage Commitment AE has sent a Storage Commitment Request and, being configured to receive response on a separate association, has closed the association, and now it gets an association request from the Storage Commitment SCP that want to send the results.

### 3.2.3.2.2 Accepted Presentation Contexts - Receive Storage Commitment Response

*syngo* Storage Commitment AE will accept Presentation Contexts as shown in the following table:

**Table 10:** Presentation context accepted for Storage Commitment

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model SOP class	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
		Explicit VR Little Endian	1.2.840.10008.1.2.1		

### 3.2.3.2.3 SOP Specific Conformance Statement - Receive Storage Commitment Response

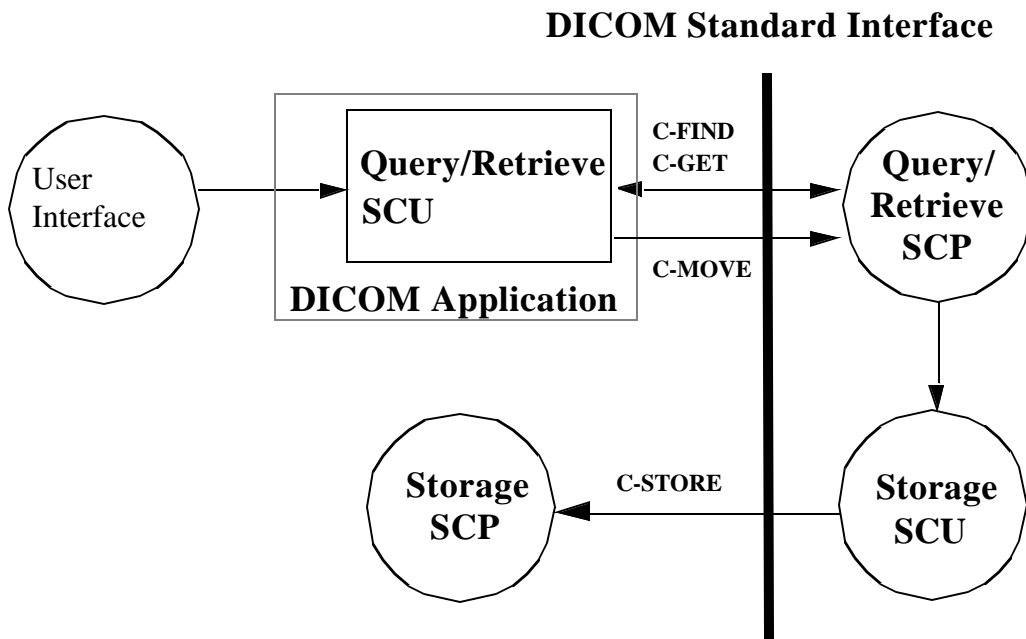
If the N\_EVENT\_REPORT received has the status of "complete - failure exists", the transaction is marked as failed, else the transaction is marked as "completed"; In both cases, a message is shown to the user.

# 4 Implementation Model Query/Retrieve

The query/retrieve service class defines 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 MR DICOM query/retrieve application supports the query/retrieve services to act as SCU and SCP.

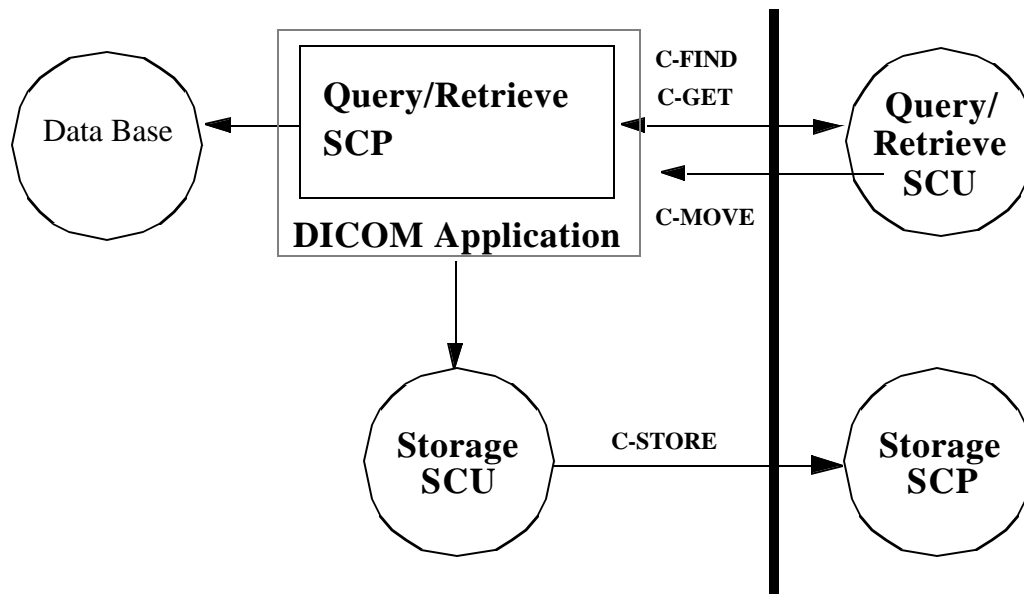
## 4.1 Application Data Flow Diagram

The MR DICOM network implementation is a Windows NT application and acts as SCU and SCP for the query/retrieve network service.



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## DICOM Standard Interface



## 4.2 Functional Definitions of Application Entities

The query/retrieve SCU requests the query/retrieve SCP to perform a match to the keys specified in the request and a C-MOVE DIMSE service initiates a C-STORE suboperation to transfer an image from a Storage SCU to a Storage SCP.

The query/retrieve SCP responds to C-FIND DIMSE services and a C-MOVE involves the Siemens MR DICOM query/retrieve SCP application to initiate a C-STORE suboperation to a Storage SCP.

All components of the Siemens MR DICOM query/retrieve SCP applications are operating as background daemon processes. They are launched at consol startup and respond to queries based on the records stored in the MR database.

## 4.3 Sequencing of real World Activities

not applicable.

## 4.4 Query/Retrieve AE Specification

The Query/Retrieve SCU request that the remote SCP perform a match of all keys specified in the request, against the information in its database and the identified images will be moved or retrieved to the same or a different storage association.

The Query/Retrieve SCP responds to queries based on the records based on its database and images will be send to the requesting SCU or to a different storage destination.

The Siemens DICOM Query/Retrieve AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as SCU and SCP:

*Table 11: SOP Classes as an Query/Retrieve SCU*

SOP Class Name	SOP Class UID
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
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

SIEMENS DICOM products provide Standard Conformance to the following DICOM V3.0 SOP Classes as an SCP:

*Table 12: SOP Classes as an Query/Retrieve SCP*

SOP Class Name	SOP Class UID
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

*Table 12: SOP Classes as an Query/Retrieve SCP*

SOP Class Name	SOP Class UID
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1
Patient/Study Only Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2
Patient/Study Only Query/Retrieve Information Model - GET	1.2.840.10008.5.1.4.1.2.3.3

### **Note**

For the DICOM Retrieve SOP classes C-MOVE and C-GET please see section 3.2.3 for more information about supported DICOM IODs and Presentation contexts supported by the Siemens Storage SCP.

## **4.4.1 Association Establishment Policies**

### **4.4.1.1 General**

The configuration of the Siemens DICOM query/retrieve application defines the Application Entity Titles, the port numbers and of course the host name and net address.

### **4.4.1.2 Number of Associations**

The Siemens DICOM Query/Retrieve AE initiates several association at a time, one for each query/retrieve request being processed.

### **4.4.1.3 Asynchronous Nature**

The Siemens DICOM Query/Retrieve AE does not support asynchronous communication (multiple outstanding transactions over a single association).

### **4.4.1.4 Implementation Identifying Information**

The Siemens MR DICOM software provides a single Implementation Class UID of

- "1.3.12.2.1107.5.2"

and an Implementation Version Name of

- "MR\_2002B\_VA21A".

## 4.4.2 Association Initiation Policy

The Query/Retrieve SCU and SCP establish an association by using the DICOM association services. During association establishment the Query/Retrieve application entities negotiate the supported SOP classes to exchange the capabilities of the SCU and the SCP.

The following DIMSE-C operations are supported as SCU:

- C-FIND
- C-MOVE

### 4.4.2.1 Real World Activity - Find SCU

#### 4.4.2.1.1 Associated Real-World Activity - Find SCU

The associated Real-World activity is to initiate query request to an SCP with the query model Patient Root or StudyRoot.

#### 4.4.2.1.2 Proposed Presentation Contexts - Find SCU

The Siemens DICOM Query application 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 Find	1.2.840.10008.5.1.4.1.2.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
Study Root Query/Retrieve Find	1.2.840.10008.5.1.4.1.2.2.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		

It is configurable which of the two query models (or both) are to be used by the Siemens Query SCU application.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Find	1.2.840.10008.5.1.4.1.2.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
Study Root Query/Retrieve Find	1.2.840.10008.5.1.4.1.2.2.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
Patient/Study Only Query/Retrieve Find	1.2.840.10008.5.1.4.1.2.3.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		

### Note

C-FIND Extended Negotiation will be NOT supported by the SCU.

#### 4.4.2.1.3 SOP Specific Conformance Statement - Find SCU

The Siemens DICOM Query/Retrieve SCU supports hierarchical queries with all mandatory search keys. On each level, the unique attributes of all previous levels are also sent (values are provided by the user by selection from a list). For instance for a query using the patient root model on Series level, the Patient ID of the current selected patient and the Study Instance UID of the current selected study are included in the message.

The *Table 13: Query attributes* describes the search keys for the two query models (Patient Root and Study Root) that the Siemens DICOM Query / Retrieve application supports as an SCU. Matchings are either wildcard, which means that the user can supply a string containing wildcards, either universal, which means that the attribute is returned no matter what value it has.

*Table 13: Query attributes*

Attribute name	Tag	Type	Matching	user input	return value displayed
<b>Patient level<sup>a</sup></b>					
Patient name	(0010,0010)	R	wildcard <sup>c</sup>	enter value	yes
Patient ID	(0010,0020)	U	wildcard <sup>c</sup>	enter value	yes
Patient's birth date	(0010,0030)	O	universal (NULL)	-	yes
Patient's sex	(0010,0040)	O	universal (NULL)	-	yes
Number of Patient related studies	(0020,1200)	O	universal (NULL)	-	yes
Number of Patient relates series	(0020,1202)	O	universal (NULL)	-	yes
Number of Patient related instances	(0020,1204)	O	universal (NULL)	-	yes
<b>Study level</b>					
Patient name <sup>b</sup>	(0010,0010)	R	wildcard <sup>c</sup>	enter value	yes
Patient ID <sup>b</sup>	(0010,0020)	R	wildcard <sup>c</sup>	enter value	yes
Study Instance UID	(0020,000D)	U	universal (NULL)	-	yes
Study id	(0020,0010)	R	universal (NULL)	-	yes
Study date	(0008,0020)	R	universal (NULL)	-	yes
Study time	(0008,0030)	R	universal (NULL)	-	yes

*Table 13: Query attributes*

<b>Attribute name</b>	<b>Tag</b>	<b>Type</b>	<b>Matching</b>	<b>user input</b>	<b>return value displayed</b>
Accession number	(0008,0050)	R	universal (NULL)	-	yes
Study description	(0008,1030)	O	universal (NULL)	-	yes
Referring physician's name	(0008,0090)	O	universal (NULL)	-	yes
Name of physician reading study	(0008,8060)	O	universal (NULL)	-	yes
Modalities in Study	(0008,0061)	O	universal (NULL)	-	yes
Storage Media File Set ID	(0008,0130)	O	universal (NULL)	-	yes
Retrieve AE Title	(0008,0054)	O	universal (NULL)	-	yes
Number of study related series	(0020,1206)	O	universal (NULL)	-	yes
Number of study related instances	(0020,1208)	O	universal (NULL)	-	yes
<b>Series level</b>					
Series instance UID	(0020,000E)	U	universal (NULL)		yes
Series number	(0020,0011)	R	universal (NULL)	-	yes
Modality	(0008,0060)	R	universal (NULL)	-	yes
Series date	(0008,0021)	O	universal (NULL)	-	yes
Series time	(0008,0031)	O	universal (NULL)	-	yes
Study ID	(0020,0010)	O	universal (NULL)	-	yes

Table 13: Query attributes

Attribute name	Tag	Type	Matching	user input	return value displayed
Series description	(0008,103E)	O	universal (NULL)	-	yes
Storage Media File Set ID	(0008,0130)	O	universal (NULL)	-	yes
Retrieve AE Title	(0008,0054)	O	universal (NULL)	-	yes
Protocol name	(0018,1030)	O	universal (NULL)	-	yes
Performed procedure step start date	(0040,0244)	O	universal (NULL)	-	yes
Performed procedure step start time	(0040,0245)	O	universal (NULL)	-	yes
Number of series related instances	(0020,1209)	O	universal (NULL)	-	yes
<b>Image level</b>					
SOP instance UID	(0008,0018)	U	universal (NULL)	-	yes
Instance Number	(0020,0013)	R	universal (NULL)	-	yes
Storage Media File Set ID	(0008,0130)	O	universal (NULL)	-	yes
Retrieve AE Title	(0008,0054)	O	universal (NULL)	-	yes
Image date	(0008,0023)	O	universal (NULL) <sup>a</sup>	-	yes
Image time	(0008,0033)	O	universal (NULL)	-	yes
Number of Frames	(0028,0008)	O	universal (NULL) <sup>a</sup>	-	yes
Image comments	(0020,4000)	O	universal (NULL)	-	yes

a. Only for Patient Root information model

b. Only for Study Root information model

c. Always a "\*" is added to the string supplied by the user

The StudyTransfer Find SCU interprets following status codes:

*Table 14: C-FIND response status*

Service Status	Meaning	Protocol Codes	Related Fields
Refused	Out of Resources	A700	(0000,0902)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
	Unable to process	Cxxx	(0000,0901) (0000,0902)
Cancel	Matching terminated due to Cancel request	FE00	None
Success	Matching is complete - No final Identifier is supplied	0000	None
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Identifier
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this identifier	FF01	Identifier

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#### 4.4.2.2 Real World Activity - Move SCU

##### 4.4.2.2.1 Associated Real-World Activity - Move SCU

The operator uses the Siemens DICOM Query application to enter the query values and then initiates the retrieval of all matching DICOM composite objects (like images) from the remote node.

This will generate retrieval requests to a remote C-MOVE SCP using the C-MOVE operation with the query model Patient Root and Study Root. The Storage Service Class Conformance Statement of the SCP must describe the C-STORE service which is generated by the C-MOVE service.

##### 4.4.2.2.2 Proposed Presentation Contexts - Move SCU

The Siemens DICOM Query/Retrieve AE 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 Move	1.2.840.10008.5.1.4.1.2.1.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	No
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
Study Root Query/Retrieve Move	1.2.840.10008.5.1.4.1.2.2.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	No
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		

**Note**

C-MOVE Extended Negotiation will be NOT supported by the SCU.

C-MOVE on Patient level is not supported by the application.

**4.4.2.2.3 SOP Specific Conformance Statement - Move SCU**

At association establishment time the C-MOVE presentation context shall be negotiated. The C-STORE sub-operations must be done on a different association to transfer images to another SCP of the Storage Service Class.

The Move SCU interprets following status codes:

*Table 15: C-MOVE response status*

Service Status	Meaning	Protocol Codes	Related Fields
Refused	Out of Resources - Unable to calculate number of matches	A701	(0000,0902)
	Out of Resources - Unable to perform suboperations	A702	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
Failed	Unable to process	Cxxx	(0000,0901) (0000,0902)

Table 15: C-MOVE response status

Service Status	Meaning	Protocol Codes	Related Fields
Cancel	Sub-operations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Warning	Sub-operations Complete - One or more Failures of Warnings	B000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Pending	Sub-operations are continuing	FF00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Success	Sub-operations Complete - No Failures or Warning	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)

## 4.4.3 Association Acceptance Policy

The Query/Retrieve SCU and SCP establish an association by using the DICOM association services. During association establishment the Query/Retrieve application entities negotiate the supported SOP classes to exchange the capabilities of the SCU and the SCP.

The following DIMSE-C operations are supported as SCP:

- C-FIND
- C-GET
- C-MOVE
- C-FIND-CANCEL
- C-GET-CANCEL
- C-MOVE-CANCEL

The SCP does support multiple C-FIND requests over the same association, but not multiple C-GET or C-MOVE requests.

### 4.4.3.1 Real World Activity - Find SCP

#### 4.4.3.1.1 Associated Real-World Activity - Find SCP

The associated Real-World activity is to respond to query requests to an SCU with the query model Patient Root, Study Root and Patient/Study Only.

#### 4.4.3.1.2 Accepted Presentation Contexts - Find SCP

Query/Retrieve AE 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 Find	1.2.840.10008.5.1.4.1.2.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
Study Root Query/Retrieve Find	1.2.840.10008.5.1.4.1.2.2.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		

Patient/Study Only Query/ Retrieve Find	1.2.840.10008.5.1.4.1.2.3.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		

### **Note**

C-FIND Extended Negotiation will be NOT supported by the SCP.

The order of preference in accepting a Transfer syntax is:

1. Explicit VR Little Endian
2. Explicit VR Big Endian
3. Implicit VR Little Endian

#### **4.4.3.1.3 SOP Specific Conformance Statement - Find SCP**

The Siemens DICOM Query/Retrieve SCP supports hierarchical queries with all mandatory and optional search keys. The query attributes will be treated Case Sensitive. The supported attributes on the various levels of the three information models are listed in following tables:

#### 4.4.3.1.3.1 Patient Root Information Model.

*Table 16: Patient level attributes, Patient Root Information Model*

Attribute name	Tag	Type	Matching
Patient name	(0010,0010)	R	single value, wildcard, universal
Patient id	(0010,0020)	U	single value, wildcard, universal
Patient's birth date	(0010,0030)	O	single value, range, universal
Patient's birth time	(0010,0032)	O	single value, range, universal
Patient's sex	(0010,0040)	O	single value, wildcard, universal
Ethnic group	(0010,2160)	O	single value, wildcard, universal
Patient comments	(0010,4000)	O	wildcard, universal
Number of Patient related studies	(0020,1200)	O	universal
Number of Patient relates series	(0020,1202)	O	universal
Number of Patient related instances	(0020,1204)	O	universal

*Table 17: Study level attributes, Patient Root Information Model*

Attribute name	Tag	Type	Matching
Study instance UID	(0020,000D)	U	single value, list of UIDs
Study id	(0020,0010)	R	single value, wildcard, universal
Study date	(0008,0020)	R	single value, range, universal
Study time	(0008,0030)	R	single value, range, universal
Accession number	(0008,0050)	R	single value, wildcard, universal

*Table 17: Study level attributes, Patient Root Information Model*

Attribute name	Tag	Type	Matching
Referring physician's name	(0008,0090)	O	single value, wildcard, universal
Study description	(0008,1030)	O	single value, wildcard, universal
Admitting diagnoses description	(0008,1080)	O	single value, wildcard, universal
Patient's age	(0010,1010)	O	single value, wildcard, universal
Patient's size	(0010,1020)	O	single value, universal
Patient's weight	(0010,1030)	O	single value, universal
Occupation	(0010,2180)	O	single value, wildcard, universal
Additional patient history	(0010,21B0)	O	wildcard, universal
Name of physician reading study	(0008,1060)	O	single value, wildcard, universal
Modalities in Study	(0008,0061)	O	multiple values, universal
Number of study related series	(0020,1206)	O	universal
Number of study related instances	(0020,1208)	O	universal

*Table 18: Series level attributes, Patient Root Information Model*

Attribute name	Tag	Type	Matching
Series instance UID	(0020,000E)	U	single value, list of UID
Series number	(0020,0011)	R	single value, universal
Modality	(0008,0060)	R	single value, wildcard, universal
Laterality	(0020,0060)	O	single value, wildcard, universal

*Table 18: Series level attributes, Patient Root Information Model*

<b>Attribute name</b>	<b>Tag</b>	<b>Type</b>	<b>Matching</b>
Body part examined	(0018,0015)	O	single value, wildcard, universal
Patient position	(0018,5100)	O	single value, wildcard, universal
Smallest pixel value in series	(0028,0108)	O	single value, universal
Largest pixel value in series	(0028,0109)	O	single value, universal
Protocol name	(0018,1030)	O	single value, wildcard, universal
Series date	(0008,0021)	O	single value, range, universal
Series time	(0008,0031)	O	single value, range, universal
Series description	(0008,103E)	O	single value, wildcard, universal
Operators name	(0008,1070)	O	single value, wildcard, universal
Performing physician's name	(0008,1050)	O	single value, wildcard, universal
Performed procedure step start date	(0040,0244)	O	universal
Performed procedure step start time	(0040,0245)	O	universal
Number of series related instances	(0020,1209)	O	universal

*Table 19: Image level attributes, Patient Root Information Model*

<b>Attribute name</b>	<b>Tag</b>	<b>Type</b>	<b>Matching</b>
SOP instance UID	(0008,0018)	U	single value, list of UID

**Table 19:** Image level attributes, Patient Root Information Model

Attribute name	Tag	Type	Matching
Image number	(0020,0013)	R	single value, universal
Image date	(0008,0023)	O	single value, range, universal
Image time	(0008,0033)	O	single value, range, universal
Modality	(0008,0060)	O	single value, wildcard, universal
Image comments	(0020,4000)	O	universal

#### 4.4.3.1.3.2 Study Root Information Model

**Table 20:** Study level attributes, Study Root Information Model

Attribute name	Tag	Type	Matching
Patient name	(0010,0010)	R	single value, wildcard, universal
Patient id	(0010,0020)	R	single value, wildcard, universal
Patient's birth date	(0010,0030)	O	single value, range, universal
Patient's birth time	(0010,0032)	O	single value, range, universal
Patient's sex	(0010,0040)	O	single value, wildcard, universal
Patient comments	(0010,4000)	O	wildcard, universal
Number of Patient related studies	(0020,1200)	O	universal
Number of Patient relates series	(0020,1202)	O	universal
Number of Patient related instances	(0020,1204)	O	universal
Study instance UID	(0020,000D)	U	single value, list of UIDs

Attribute name	Tag	Type	Matching
Study id	(0020,0010)	R	single value, wildcard, universal
Study date	(0008,0020)	R	single value, range, universal
Study time	(0008,0030)	R	single value, range, universal
Accession number	(0008,0050)	R	single value, wildcard, universal
Referring physician's name	(0008,0090)	O	single value, wildcard, universal
Study description	(0008,1030)	O	single value, wildcard, universal
Admitting diagnoses description	(0008,1080)	O	single value, wildcard, universal
Patient's age	(0010,1010)	O	single value, wildcard, universal
Patient's size	(0010,1020)	O	single value, universal
Patient's weight	(0010,1030)	O	single value, universal
Occupation	(0010,2180)	O	single value, wildcard, universal
Additional patient history	(0010,21B0)	O	wildcard, universal
Name of physician reading study	(0008,8060)	O	single value, wildcard, universal
Modalities in Study	(0008,0061)	O	multiple values, universal
Number of study related series	(0020,1206)	O	universal
Number of study related instances	(0020,1208)	O	universal

### 4.4.3.1.3.3

*Table 21: Series level attributes, Study Root Information Model*

Attribute name	Tag	Type	Matching
Series instance UID	(0020,000E)	U	single value, list of UID
Series number	(0020,0011)	R	single value, universal
Modality	(0008,0060)	R	single value, wildcard, universal
Laterality	(0020,0060)	O	single value, wildcard, universal
Body part examined	(0018,0015)	O	single value, wildcard, universal
Patient position	(0018,5100)	O	single value, wildcard, universal
Smallest pixel value in series	(0028,0108)	O	single value, universal
Largest pixel value in series	(0028,0109)	O	single value, universal
Protocol name	(0018,1030)	O	single value, wildcard, universal
Series date	(0008,0021)	O	single value, range, universal
Series time	(0008,0031)	O	single value, range, universal
Series description	(0008,103E)	O	single value, wildcard, universal
Operators name	(0008,1070)	O	single value, wildcard, universal
Performing physician's name	(0008,1050)	O	single value, wildcard, universal
Performed procedure step start date	(0040,0244)	O	universal
Performed procedure step start time	(0040,0245)	O	universal

Number of series related instances	(0020,1209)	O	universal
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*Table 22: Image level attributes, Study Root Information Model*

Attribute name	Tag	Type	Matching
SOP instance UID	(0008,0018)	U	single value, list of UID
Image number	(0020,0013)	R	single value, universal
Image date	(0008,0023)	O	single value, range, universal
Image time	(0008,0033)	O	single value, range, universal
Modality	(0008,0060)	O	single value, wildcard, universal
Image comments	(0020,4000)	O	universal

#### 4.4.3.1.3.4 Patient Study Only Information models

*Table 23: Patient instance level, Patient Study Only Information Model*

Attribute name	Tag	Type	Matching
Patient name	(0010,0010)	R	single value, wildcard, universal
Patient id	(0010,0020)	U	single value, wildcard, universal
Patient's birth date	(0010,0030)	O	single value, range, universal
Patient's birth time	(0010,0032)	O	single value, range, universal
Patient's sex	(0010,0040)	O	single value, wildcard, universal
Ethnic group	(0010,2160)	O	single value, wildcard, universal
Patient comments	(0010,4000)	O	wildcard, universal
Number of Patient related studies	(0020,1200)	O	universal

Attribute name	Tag	Type	Matching
Number of Patient relates series	(0020,1202)	O	universal
Number of Patient related instances	(0020,1204)	O	universal

*Table 24: Study level attributes, Patient Study Only Information Model*

Attribute name	Tag	Type	Matching
Study instance UID	(0020,000D)	U	single value, list of UIDs
Study id	(0020,0010)	R	single value, wildcard, universal
Study date	(0008,0020)	R	single value, range, universal
Study time	(0008,0030)	R	single value, range, universal
Accession number	(0008,0050)	R	single value, wildcard, universal
Referring physician's name	(0008,0090)	O	single value, wildcard, universal
Study description	(0008,1030)	O	single value, wildcard, universal
Admitting diagnoses description	(0008,1080)	O	single value, wildcard, universal
Patient's age	(0010,1010)	O	single value, wildcard, universal
Patient's size	(0010,1020)	O	single value, universal
Patient's weight	(0010,1030)	O	single value, universal
Occupation	(0010,2180)	O	single value, wildcard, universal
Additional patient history	(0010,21B0)	O	wildcard, universal
Name of physician reading study	(0008,8060)	O	single value, wildcard, universal

Attribute name	Tag	Type	Matching
Modalities in Study	(0008,0061)	O	multiple values, universal
Number of study related series	(0020,1206)	O	universal
Number of study related instances	(0020,1208)	O	universal

**ATTENTION! In DICOM wildcard queries the symbol '?' is treated as '\*' by Find SCP. So a wildcard query with "?abc\*" is actually treated as "\*abc\*"**

**If the value for the unique key PatientID is not known, it may be returned empty.**

The C\_FIND\_RSP message will contain the following attributes:

- Specific Character Set (0008,0005)
- Query/Retrieve Level (0008,0052) from the C\_FIND\_RQ
- RetrieveAETitle (0008,0054) at study, series and image level.  
This value is a list of AE titles from which the instances can be retrieved. Might be NULL except for the lowest level of the query model (Image level for Patient Root or Study Root and Study level for Patient/Study Only)
- Storage-Media FileSet ID (0088,0130) at level study, series and image  
If Storage-Media FileSet ID is not present a NULL value will be returned
- attributes requested by C\_FIND\_RQ and supported by the SCP.

### Note

On IMAGE level, if the "Image Comments" attribute is present in the C-FIND-RQ but it is not valid, the attribute will not be included in the C-FIND-RSP.

Relational queries are not supported.

A Remote DICOM AE can cancel the query by sending a C\_CANCEL\_FIND\_RQ message. If the Find SCP receives C\_CANCEL\_FIND\_RQ before it has completed the processing of the matches it shall stop the database matching process and return a status of Cancelled to the remote DICOM AE.

The Find SCP returns following status codes:

*Table 25: C-FIND return status*

Service Status	Meaning	Protocol Codes	Related Fields
Refused	Out of Resources	A700	(0000,0902)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
	Unable to process	C001	(0000,0901) (0000,0902)
Cancel	Matching terminated due to Cancel request	FE00	None
Success	Matching is complete - No final Identifier is supplied	0000	None
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00	Identifier
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this identifier	FF01	Identifier

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#### 4.4.3.2 Real World Activity - Get SCP

##### 4.4.3.2.1 Associated Real-World Activity - Get SCP

The associated Real-World activity is to respond to retrieve requests initiated from an SCU. The SCP supports the query model Patient Root, Study Root and Patient/Study Only. The Storage Service Class Conformance Statement describes the C-STORE service which is generated by the C-GET service.

##### 4.4.3.2.2 Accepted Presentation Contexts - Get SCP

Query/Retrieve AE 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 Get	1.2.840.10008.5.1.4.1.2.1.3	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
Study Root Query/Retrieve Get	1.2.840.10008.5.1.4.1.2.2.3	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
Patient/Study Only Query/Retrieve Get	1.2.840.10008.5.1.4.1.2.3.3	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		

**Note**

C-GET Extended Negotiation will be NOT supported by the SCP.

The order of preference in accepting a Transfer syntax is:

1. Explicit VR Little Endian
2. Explicit VR Big Endian
3. Implicit VR Little Endian

**4.4.3.2.3 SOP Specific Conformance Statement - Get SCP**

At association establishment time the C-GET presentation context must be negotiated along with the C-STORE sub-operations which must be accomplished on the same association as the C-GET operation.

The Get SCP returns following status codes:

*Table 26: C-GET return status*

Service Status	Meaning	Protocol Codes	Related Fields
Refused	Out of Resources - Unable to calculate number of matches	A701	(0000,0902)
	Out of Resources - Unable to perform suboperations	A702	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
Failed	Unable to process	C001	(0000,0901) (0000,0902)
Cancel	Sub-operations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Warning	Sub-operations Complete - One or more Failures of Warnings	B000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Pending	Sub-operations are continuing	FF00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Success	Sub-operations Complete - No Failures or Warning	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)

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### 4.4.3.3 Real World Activity - Move SCP

#### 4.4.3.3.1 Associated Real-World Activity - Move SCP

The associated Real-World activity is to respond to retrieve requests to an SCU. The SCP supports the query model Patient Root, Study Root and Patient/Study Only. The Storage Service Class Conformance Statement describes the C-STORE service which is generated by the C-MOVE service.

### 4.4.3.3.2 Accepted Presentation Contexts - Move SCP

The Siemens DICOM Query/Retrieve AE 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 Move	1.2.840.10008.5.1.4.1.2.1.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
Study Root Query/Retrieve Move	1.2.840.10008.5.1.4.1.2.2.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		
Patient/Study Only Query/Retrieve Move	1.2.840.10008.5.1.4.1.2.3.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	See Note
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		

**Note:**

C-MOVE Extended Negotiation will be NOT supported by the SCP.

The order of preference in accepting a Transfer syntax is:

1. Explicit VR Little Endian
2. Explicit VR Big Endian
3. Implicit VR Little Endian

### 4.4.3.3.3 SOP Specific Conformance Statement - Move SCP

At association establishment time the C-MOVE presentation context shall be negotiated. The C-STORE sub-operations is done on a different association, specified in the C-MOVE request, to transfer images to another SCP of the Storage Service Class.

The Move SCP returns following status codes:

*Table 27: C-MOVE return status*

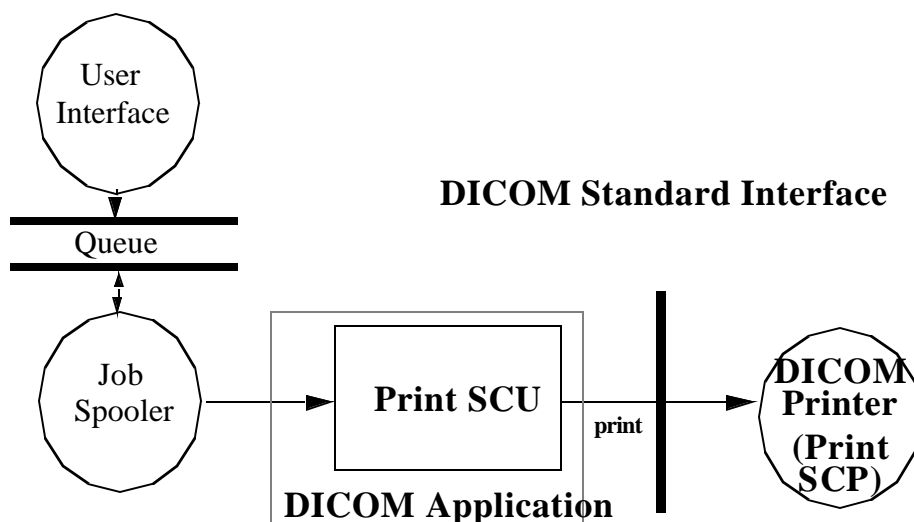
<b>Service Status</b>	<b>Meaning</b>	<b>Protocol Codes</b>	<b>Related Fields</b>
Refused	Out of Resources - Unable to calculate number of matches	A701	(0000,0902)
	Out of Resources - Unable to perform suboperations	A702	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Failed	Identifier does not match SOP Class	A900	(0000,0901) (0000,0902)
Failed	Unable to process	C001	(0000,0901) (0000,0902)
Cancel	Sub-operations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Warning	Sub-operations Complete - One or more Failures of Warnings	B000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Pending	Sub-operations are continuing	FF00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Success	Sub-operations Complete - No Failures or Warning	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)

## 5 Implementation Model Print

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. The MR DICOM print application supports the print management DIMSE services to act as SCU.

### 5.1 Application Data Flow Diagram

The MR-DICOM network implementation is a Windows NT application and acts as SCU for the print management network service.



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### 5.2 Functional Definitions of Application Entities

The user invokes a print job and the SCU uses the SOP classes of a film session, a film box and image boxes for acquiring all the information which is required for a film session. The N-ACTION is used to print the film session.

The MR DICOM Basic Print application offer the user the following features:

- + user functions are Filming/Setting (select documentation features), Filming/Configuration ( film format and size properties, image quality properties ), virtuell Filmsheet (film images in batch jobs) and Filming/Jobcontrol ( change the priority or restart film jobs),
- + selected images are allocated to film jobs. Jobs are spooled to the Print SCU,
- + the SCU invokes a print job by using the SOP classes of a film session, a film box and image boxes for acquiring all the information which is required for a film session. The N-Action is used to print the film session.

## 5.3 Sequencing of real World Activities

Not applicable.

## 5.4 Print AE Specification

The print management SCU invokes print management DIMSE services to transfer images from the local AE to the remote SCP AE to print the images with the defined film format and size on a selected network DICOM hardcopy printer. See DICOM part 4 annex H.

SIEMENS DICOM products provide Standard Conformance to the following DICOM V3.0 Basic Grayscale Print Management Meta SOP Class, Basic Color Print Management Meta SOP Class and the optional Print Job SOP Class as an SCU:

**Table 28:** Basic Gray Scale Print Management Meta SOP-Classes

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

**Table 29:** Basic Color Print Management Meta SOP-Classes

SOP Class Name	SOP Class UID	Usage SCU/SCP
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	M/M
- Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	M/M
- Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	M/M
- Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	M/M
- Printer SOP Class	1.2.840.10008.5.1.1.16	M/M
Print Job SOP Class	1.2.840.10008.5.1.1.14	U/U

---

## 5.4.1 Association Establishment Policies

### 5.4.1.1 General

The configuration of the Siemens DICOM print management SCU defines the Application Entity Titles, the port numbers and of course the host name and net address.

### 5.4.1.2 Number of Associations

The Siemens DICOM application initiates one/several association(s) at a time, one for each transfer request being processed.

### 5.4.1.3 Asynchronous Nature

The Siemens DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

### 5.4.1.4 Implementation Identifying Information

The Siemens MR DICOM software provides a single Implementation Class UID of

- “1.3.12.2.1107.5.2”

and an Implementation Version Name of

- “MR\_2002B\_VA21A”.

## 5.4.2 Association Initiation Policy

The Print Management SCU and SCP establish an association by using the DICOM association services. During association establishment the Print Management application entities negotiate the supported SOP classes to exchange the capabilities of the SCU and the SCP. If the SCU supports only mandatory SOP classes, the negotiation of optional capabilities is not necessary.

### 5.4.2.1 Real-World Activity

#### 5.4.2.1.1 Associated Real-World Activity

The associated Real-World activity is to print over a network a set of images on a film sheet with one or more copies. The images are converted to Standard\1-1. If the response from the remote application contains a status other than Success or Warning the association is aborted.

### 5.4.2.1.2 Proposed Presentation Contexts

The Siemens DICOM application 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 Gray-scale Print Management Meta SOP class	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		
Basic film session SOP class	1.2.840.10008.5.1.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		
Basic film box SOP class	1.2.840.10008.5.1.1.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		
Basic gray-scale image box SOP class	1.2.840.10008.5.1.1.4	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		
Printer SOP class	1.2.840.10008.5.1.1.16	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		

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Print Job SOP class	1.2.840.10008.5.1.1.14	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		
Presentation LUT SOP class	1.2.840.10008.5.1.1.23	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Color Print Management Meta SOP class	1.2.840.10008.5.1.1.18	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		
Basic film session SOP class	1.2.840.10008.5.1.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		
Basic film box SOP class	1.2.840.10008.5.1.1.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		

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Basic color image box SOP class	1.2.840.10008.5.1.1.4.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		
Printer SOP class	1.2.840.10008.5.1.1.16	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		
Print Job SOP class	1.2.840.10008.5.1.1.14	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax,	1.2.840.10008.1.2.2		

### 5.4.2.1.3 SOP Specific Conformance Statement

The Siemens DICOM SCU conforms to the DICOM Basic Grayscale Print Management Meta SOP Class and 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.

#### 5.4.2.1.3.1 SOP Specific Conformance to Basic Film Session SOP Class

The Basic Film Session information object definition describes all the user defined parameter 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 Siemens DICOM Print application 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 following attributes:

**Table 30:** Used Basic Film Session N-CREATE\_RQ attributes

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

The Affected SOP Instance UID received in N\_CREATE\_RSP message from SCP will be saved internally and used for later requests like N\_DELETE\_RQ on the Basic Film Session SOP Class - see table below:)

**Table 31:** Attributes of the N\_DELETE\_RQ on the Basic Film Session SOP Class

Attribute name	Tag	Source of information
Requested SOP Instance UID	(0008,0018)	Affected SOP Instance UID of N_CREATE_RSP on Basic Film Session

The N\_DELETE\_RQ on the Basic Film Session SOP Class is used to delete the complete Basic Film Session SOP Instance hierarchy.

The Basic Film Session SOP class interprets following status codes (from N\_CREATE\_RSP, N\_DELETE\_RSP messages):

**Table 32:** Basic Film Session SOP status

Service Status	Meaning	Protocol Codes
Failure	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

*Table 32: Basic Film Session SOP status*

Service Status	Meaning	Protocol Codes
Warning	Film box does not contain image box (empty page)	B602
Success	Film belonging to the film session are accepted for printing	0000

### 5.4.2.1.3.2 SOP Specific Conformance to 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 as SCU are:

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

The Basic Film Box SOP class N\_CREATE\_RQ message uses following attributes (the used values for each attribute depend how the DICOM Printer is configured within the Siemens product):

*Table 33: Used Film Box N-CREATE\_RQ attributes*

Attribute name	Tag	Usage SCU	Supported Values
Image Display Format	(2010,0010)	M	STANDARD\1-1
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
Film Size ID	(2010,0050)	M	8INX10IN 10INX12IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN 24CMX24CM 24CMX30CM

**Table 33:** Used Film Box N-CREATE\_RQ attributes

Attribute name	Tag	Usage SCU	Supported Values
Magnification Type	(2010,0060)	M	BILINEAR CUBIC NONE REPLICATE
Max Density	(2010,0130)	U	
Min Density	(2010,0120)	U	
Illumination	(2010,015E)	U	> 0 Required if Presentation LUT is present
Reflective Ambient Light	(2010,0160)	U	> 0 Required if Presentation LUT is present
Referenced Presentation LUT SOP Class UID	(2050,0500)	U	

The N\_CREATE\_RSP message from the SCP then contains the References Image Box Sequence with its SOP Class and Instance UIDs which is stored internally and then used for the Basic Image Box SOP Class N-SET RQ messages.

After all parameters for the Image boxes on the film sheet have been set then the Siemens DICOM print application SCU will issue a N\_ACTION\_RQ message with the SOP Instance UID of the Basic Film Box (returned in N\_CREATE\_RSP of Basic Film Box SOP class) and the Action Type ID set to 1.

The Affected SOP Instance UID received in N\_CREATE\_RSP message from SCP will be saved internally and can be used later for N\_DELETE\_RQ request on the Basic Film Box SOP Class - see table below:)

**Table 34:** Attributes of the N\_DELETE\_RQ on the Basic Film Session SOP Class

Attribute name	Tag	Source of information
Requested SOP Instance UID	(0008,0018)	Affected SOP Instance UID of N_CREATE_RSP on Basic Film Box

The Basic Film Box SOP class interprets following status codes from the N\_CREATE\_RSP, N\_DELETE\_RSP and N\_ACTION\_RSP messages:

*Table 35: Basic Film Box SOP status*

<b>Service Status</b>	<b>Meaning</b>	<b>Protocol Codes</b>
Failure	Unable to create print job; print queue is full	C602
	Image size is larger than image 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

### 5.4.2.1.3.3 SOP Specific Conformance to 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 following attributes

**Table 36:** Used Basic Grayscale Image Box N-SET attributes

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 for grayscale images
>Rows	(0028,0010)	M	
>Columns	(0028,0011)	M	
>Pixel Aspect Ratio	(0028,0034)	M	
>Bits Allocated	(0028,0100)	M	8
>Bits Stored	(0028,0101)	M	8
>High Bit	(0028,0102)	M	7
>Pixel Representation	(0028,0103)	M	0
>Pixel Data	(7FE0,0010)	M	

The Grayscale Image Box SOP class interprets following status codes:

**Table 37:** Basic Grayscale Image Box SOP status

Service Status	Meaning	Protocol Codes
Warning	Requested MinDensity or MaxDensity outside of printer's operating range	B605

*Table 37: Basic Grayscale Image Box SOP status*

Service Status	Meaning	Protocol Codes
Failure	Image contains more pixel than printer can print in Image box	C603
	Insufficient memory in printer to store the image	C605
Success		0000

#### 5.4.2.1.3.4 SOP Specific Conformance to 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 following attributes

*Table 38: Used Basic Color Image Box N-SET attributes*

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

The Color Image Box SOP class interprets following status codes:

**Table 39:** Basic Color Image Box SOP status

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

#### 5.4.2.1.3.5 SOP Specific Conformance to Presentation LUT SOP Class

The Presentation LUT Information Object, if installed in the hardcopy LUT configuration platform, is an abstraction of a pre-defined Presentation LUT. The objective of the Presentation LUT is to realize image display 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 responses. They are intended to facilitate common input for both hardcopy and softcopy display devices. P-Values are intended to be independent of the specific class or characteristic of the display device.

The SCU uses the Illumination, Reflective Ambient Light and Presentation LUT Shape attributes to indicate conformance to the Presentation LUT SOP Class.

Supported as SCU are:

- N-CREATE
- N-DELETE

**Table 40:** Used Presentation LUT N\_CREATE attributes

Attribute name	Tag	Usage SCU	Supported Values
Presentation LUT Shape	(2050,0020)	MC	IDENTITY

The specific status values for the N-CREATE message are defined as follows:

*Table 41: Presentation LUT SOP status*

Service Status	Meaning	Protocol Codes
Warning	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	B605
Success	Presentation LUT successfully created.	0000

### 5.4.2.1.3.6 SOP Specific Conformance to Printer SOP Class

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

The Siemens DICOM Print application 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 Print SCP for its status or can receive Events from the Print SCP asynchronously:

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

In both cases the following information is supported:

*Table 42: Used Printer N-EVENT report*

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 43: Mandatory Printer N-GET\_RSP, N\_EVENT\_REPORT\_RQ attributes*

Attribute name	Tag	Usage SCP	supported values
Printer Status	(2110,0010)	M	NORMAL FAILURE WARNING
Printer Status Info	(2110,0020)	M	See Sec.5.4.2.1.3.8

For a detailed description of how *syngo* reacts to the various messages please refer to the section: "Behavior of SCU when receiving information" .

#### 5.4.2.1.3.7 SOP Specific Conformance to Print Job SOP Class

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

The Siemens DICOM Print 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:

- N-EVENT-REPORT

The following information is supported:

**Table 44:** Used Print Job N-EVENT report

Event type name	Event	Attributes	Tag	Usage SCU
Normal	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

Table 44: Used Print Job N-EVENT report

Event type name	Event	Attributes	Tag	Usage SCU
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

For a detailed description of how *syngo* reacts to the various messages please refer to the section: "Behavior of SCU when receiving information" .

### 5.4.2.1.3.8 Behavior of SCU when receiving information

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

Table 45: Printer Status Infos within Printer SOP Class/Execution Status Infos within Print Job SOP Class

Printer Status info/ Execution Status info	Description	Message string visible in the Status Bar	Other action for syngo/camera symbol
NORMAL	Camera is ready.	Camera is ready.	<None>/idle
BAD RECEIVE MGZ	There is a problem with the film receive magazine. Films from the printer cannot be transported into the magazine.	Problem with receive magazine.	<None>/interact
BAD SUPPLY MGZ	There is a problem with a film supply magazine. Films from this magazine cannot be transported into the printer.	Problem with supply magazine.	<None>/interact
CALIBRATING	Printer is performing self calibration, it is expected to be available for normal operation shortly.	Self calibration. Please wait.	<None>/idle
CALIBRATION ERR	An error in the printer calibration has been detected, quality of processed films may not be optimal.	Problem in calibration. Film quality may not be optimal.	<None>/interact

<b>Printer Status info/ Execution Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
CHECK CHEMISTRY	A problem with the processor chemicals has been detected, quality of processed films may not be optimal.	Problem with chemistry. Film quality may not be optimal.	<None>/interact
CHECK SORTER	There is an error in the film sorter	Error in film sorter.	<None>/interact
CHEMICALS EMPTY	There are no processing chemicals in the processor, films will not be printed and processed until the processor is back to normal.	Camera chemistry empty. Please check.	<None>/interact
CHEMICALS LOW	The chemical level in the processor is low, if not corrected, it will probably shut down soon.	Camera chemistry low. Please check.	<None>/interact
COVER OPEN	One or more printer or processor covers, drawers, doors are open.	Camera cover, drawer or door open.	<None>/interact
ELEC CONFIG ERR	Printer configured improperly for this job.	Camera configured improperly for this job. Queue stopped.	<b>Queue for this camera will be STOPPED/Queue stopped</b>
ELEC DOWN	Printer is not operating due to some unspecified electrical hardware problem.	Camera electrical hardware problem.	<None>/interact
ELEC SW ERROR	Printer not operating for some unspecified software error.	Camera software problem. Queue stopped.	<b>Queue for this camera will be STOPPED/queue stopped</b>
EMPTY 8x10	The 8x10 inch film supply magazine is empty.	8x10 film supply empty.	<None>/interact
EMPTY 8x10 BLUE	The 8x10 inch blue film supply magazine is empty.	8x10 blue film supply empty.	<None>/interact
EMPTY 8x10 CLR	The 8x10 inch clear film supply magazine is empty.	8x10 clear film supply empty.	<None>/interact
EMPTY 8x10 PAPER	The 8x10 inch paper supply magazine is empty.	8x10 paper supply empty.	<None>/interact
EMPTY 10x12	The 10x12 inch film supply magazine is empty.	10x12 film supply empty.	<None>/interact
EMPTY 10x12 BLUE	The 10x12 inch blue film supply magazine is empty.	10x12 blue film supply empty.	<None>/interact

<b>Printer Status info/ Execution Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
EMPTY 10x12 CLR	The 10x12 inch clear film supply magazine is empty.	10x12 clear film supply empty.	<None>/interact
EMPTY 10x12 PAPER	The 10x12 inch paper supply magazine is empty.	10x12 paper supply empty.	<None>/interact
EMPTY 10x14	The 10x14 inch film supply magazine is empty.	10x14 film supply empty.	<None>/interact
EMPTY 10x14 BLUE	The 10x14 inch blue film supply magazine is empty.	10x14 blue film supply empty.	<None>/interact
EMPTY 10x14 CLR	The 10x14 inch clear film supply magazine is empty.	10x14 clear film supply empty.	<None>/interact
EMPTY 10x14 PAPER	The 10x14 inch paper supply magazine is empty.	10x14 paper supply empty.	<None>/interact
EMPTY 11x14	The 11x14 inch film supply magazine is empty.	11x14 film supply empty.	<None>/interact
EMPTY 11x14 BLUE	The 11x14 inch blue film supply magazine is empty.	11x14 blue film supply empty.	<None>/interact
EMPTY 11x14 CLR	The 11x14 inch clear film supply magazine is empty.	11x14 clear film supply empty.	<None>/interact
EMPTY 11x14 PAPER	The 11x14 inch paper supply magazine is empty.	11x14 paper supply empty.	<None>/interact
EMPTY 14x14	The 14x14 inch film supply magazine is empty.	14x14 film supply empty.	<None>/interact
EMPTY 14x14 BLUE	The 14x14 inch blue film supply magazine is empty.	14x14 blue film supply empty.	<None>/interact
EMPTY 14x14 CLR	The 14x14 inch clear film supply magazine is empty.	14x14 clear film supply empty.	<None>/interact
EMPTY 14x14 PAPER	The 14x14 inch paper supply magazine is empty.	14x14 paper supply empty.	<None>/interact
EMPTY 14x17	The 14x17 inch film supply magazine is empty.	14x17 film supply empty.	<None>/interact
EMPTY 14x17 BLUE	The 14x17 inch blue film supply magazine is empty.	14x17 blue film supply empty.	<None>/interact
EMPTY 14x17 CLR	The 14x17 inch clear film supply magazine is empty.	14x17 clear film supply empty.	<None>/interact
EMPTY 14x17 PAPER	The 14x17 inch paper supply magazine is empty.	14x17 paper supply empty.	<None>/interact

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<b>Printer Status info/ Execution Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
EMPTY 24x24	The 24x24 inch film supply magazine is empty.	24x24 film supply empty.	<None>/interact
EMPTY 24x24 BLUE	The 24x24 inch blue film supply magazine is empty.	24x24 blue film supply empty.	<None>/interact
EMPTY 24x24 CLR	The 24x24 inch clear film supply magazine is empty.	24x24 clear film supply empty.	<None>/interact
EMPTY 24x24 PAPER	The 24x24 inch paper supply magazine is empty.	24x24 paper supply empty.	<None>/interact
EMPTY 24x30	The 24x30 inch film supply magazine is empty.	24x30 film supply empty.	<None>/interact
EMPTY 24x30 BLUE	The 24x30 inch blue film supply magazine is empty.	24x30 blue film supply empty.	<None>/interact
EMPTY 24x30 CLR	The 24x30 inch clear film supply magazine is empty.	24x30 clear film supply empty.	<None>/interact
EMPTY 24x30 PAPER	The 24x30 inch paper supply magazine is empty.	24x30 paper supply empty.	<None>/interact
EMPTY A4 PAPER	The A4 paper supply magazine is empty.	A4 paper supply empty.	<None>/interact
EMPTY A4 TRANS	The A4 transparency supply magazine is empty.	A4 transparency supply empty.	<None>/interact
EXPOSURE FAILURE	The exposure device has failed due to some unspecified reason.	Exposure device has failed.	<None>/interact
FILM JAM	A film transport error has occurred and a film is jammed in the printer or processor.	Film jam.	<None>/interact
FILM TRANSP ERR	There is a malfunction with the film transport, there may or may not be a film jam.	Film transport problem.	<None>/interact
FINISHER EMPTY	The finisher is empty.	Finisher is empty.	<None>/interact
FINISHER ERROR	The finisher is not operating due to some unspecified reason.	Finisher problem.	<None>/interact
FINISHER LOW	The finisher is low on supplies	Finisher low.	<None>/interact

<b>Printer Status info/ Execution Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
LOW 8x10	The 8x10 inch film supply magazine is low.	8x10 film supply low.	<None>/interact
LOW 8x10 BLUE	The 8x10 inch blue film supply magazine is low.	8x10 blue film supply low.	<None>/interact
LOW 8x10 CLR	The 8x10 inch clear film supply magazine is low.	8x10 clear film supply low.	<None>/interact
LOW 8x10 PAPER	The 8x10 inch paper supply magazine is low.	8x10 paper supply low.	<None>/interact
LOW 10x12	The 10x12 inch film supply magazine is low.	10x12 film supply low.	<None>/interact
LOW 10x12 BLUE	The 10x12 inch blue film supply magazine is low.	10x12 blue film supply low.	<None>/interact
LOW 10x12 CLR	The 10x12 inch clear film supply magazine is low.	10x12 clear film supply low.	<None>/interact
LOW 10x12 PAPER	The 10x12 inch paper supply magazine is low.	10x12 paper supply low.	<None>/interact
LOW 10x14	The 10x14 inch film supply magazine is low.	10x14 film supply low.	<None>/interact
LOW 10x14 BLUE	The 10x14 inch blue film supply magazine is low.	10x14 blue film supply low.	<None>/interact
LOW 10x14 CLR	The 10x14 inch clear film supply magazine is low.	10x14 clear film supply low.	<None>/interact
LOW 10x14 PAPER	The 10x14 inch paper supply magazine is low.	10x14 paper supply low.	<None>/interact
LOW 11x14	The 11x14 inch film supply magazine is low.	11x14 film supply low.	<None>/interact
LOW 11x14 BLUE	The 11x14 inch blue film supply magazine is low.	11x14 blue film supply low.	<None>/interact
LOW 11x14 CLR	The 11x14 inch clear film supply magazine is low.	11x14 clear film supply low.	<None>/interact
LOW 11x14 PAPER	The 11x14 inch paper supply magazine is low.	11x14 paper supply low.	<None>/interact
LOW 14x14	The 14x14 inch film supply magazine is low.	14x14 film supply low.	<None>/interact
LOW 14x14 BLUE	The 14x14 inch blue film supply magazine is low.	14x14 blue film supply low.	<None>/interact

<b>Printer Status info/ Execution Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
LOW 14x14 CLR	The 14x14 inch clear film supply magazine is low.	14x14 clear film supply low.	<None>/interact
LOW 14x14 PAPR	The 14x14 inch paper supply magazine is low.	14x14 paper supply low.	<None>/interact
LOW 14x17	The 14x17 inch film supply magazine is low.	14x17 film supply low.	<None>/interact
LOW 14x17 BLUE	The 14x17 inch blue film supply magazine is low.	14x17 blue film supply low.	<None>/interact
LOW 14x17 CLR	The 14x17 inch clear film supply magazine is low.	14x17 clear film supply low.	<None>/interact
LOW 14x17 PAPR	The 14x17 inch paper supply magazine is low.	14x17 paper supply low.	<None>/interact
LOW 24x24	The 24x24 inch film supply magazine is low.	24x24 film supply low.	<None>/interact
LOW 24x24 BLUE	The 24x24 inch blue film supply magazine is low.	24x24 blue film supply low.	<None>/interact
LOW 24x24 CLR	The 24x24 inch clear film supply magazine is low.	24x24 clear film supply low.	<None>/interact
LOW 24x24 PAPR	The 24x24 inch paper supply magazine is low.	24x24 paper supply low.	<None>/interact
LOW 24x30	The 24x30 inch film supply magazine is low.	24x30 film supply low.	<None>/interact
LOW 24x30 BLUE	The 24x30 inch blue film supply magazine is low.	24x30 blue film supply low.	<None>/interact
LOW 24x30 CLR	The 24x30 inch clear film supply magazine is low.	24x30 clear film supply low.	<None>/interact
LOW 24x30 PAPR	The 24x30 inch paper supply magazine is low.	24x30 paper supply low.	<None>/interact
LOW A4 PAPR	The A4 paper supply magazine is low.	A4 paper supply low.	<None>/interact
LOW A4 TRANS	The A4 transparency supply magazine is low.	A4 transparency supply low.	<None>/interact
NO RECEIVE MGZ	The film receive magazine no available.	Film receiver not available.	<None>/interact
NO RIBBON	The ribbon cartridge needs to be replaced.	Replace ribbon cartridge.	<None>/interact

<b>Printer Status info/ Execution Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
NO SUPPLY MGZ	The film supply magazine specified for this job is not available.	Film supply not available.	<None>/interact
CHECK PRINTER	The printer is not ready at this time, operator intervention is required to make the printer available.	Check camera.	<None>/interact
CHECK PROC	The processor is not ready at this time, operator intervention is required to make the printer available.	Check processor.	<None>/interact
PRINTER DOWN	The printer is not operating due to some unspecified reason.	Camera down.	<None>/interact
PRINTER INIT	The printer is not ready at this time, it is expected to become available without intervention, For example, it may be in a normal warm-up state.	Camera initializing.	<None>/idle
PRINTER OFFLINE	The printer has been disabled by an operator or service person.	Camera off-line.	<None>/interact
PROC DOWN	The processor is not operating due to some unspecified reason.	Processor down.	<None>/interact
PROC INIT	The processor is not ready at this time, it is expected to become available without intervention. For example, it may be in a normal warm-up state.	Processor initializing.	<None>/idle
PROC OVERFLOW FL	Processor chemicals are approaching the overflow full mark.	Processor chemicals overflow.	<None>/interact
PROC OVERFLOW HI	Processor chemicals have reached the overflow full mark.	Processor chemicals near overflow.	<None>/interact
QUEUED	Print job in Queue	-	<None>/idle
RECEIVER FULL	The Film receive magazine is full.	Receiver full.	<None>/interact

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

**Table 46:** Printer Status Infos: Additional Agfa printer status infos

<b>Printer Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
WARMING UP	Printer is in the warm-up stage. Spooling of print jobs to disk is still possible.	Camera is warming up.	<None>idle
OFFLINE	Printer is switched off-line. Spooling of print jobs to disk is still possible.	Camera is switched off-line.	<None>/interact
NONE	General printer warning, no specific information is available. Spooling of print jobs to disk is still possible.	-	<None>/idle
-	-	-	-

**Table 47:** Printer Status Infos: Additional Kodak infos for Pacs Link (formerly Imation cameras)

<b>Printer Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
SUPPLY MGZ ERR	The supply magazine has an error.	Film supply has an error.	<None>/interact
-	-	-	-

*Table 48: Printer Status Infos: Additional Kodak infos for Kodak 190*

<b>Printer Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
PRINTER STOPPED	The printer has stopped	Camera has stopped.	<None>/interact
FATAL ERROR	Fatal error.	Fatal error. Queue stopped.	<b>Queue for this camera will be STOPPED/queue stopped</b>
-	-	-	-

*Table 49: Printer Status Infos: Additional Kodak infos for 2180/1120*

<b>Printer Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
PRINTER NOT RDY	Printer not ready.	Camera not ready.	<None>/interact
CHECK PROCESSOR	Check processor.	Check processor.	<None>/interact
NO TONER	No toner.	No toner.	<None>/interact
FATAL	Fatal error.	Fatal error. Queue stopped.	<b>Queue for this camera will be STOPPED/queue stopped</b>
-	-	-	-

*Table 50: Printer Status Infos: Additional Codonics infos*

<b>Printer Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
STANDARD	Printer is ready.	Camera is ready.	<None>/Normal
LOAD A-SIZE	Load A-size media.	Load A-size media.	<None>/interact
LOAD A-DVPAPER	Load A-size black and white paper.	Load A-size black and white paper.	<None>/interact
LOAD A-CVPAPER	Load A-size color paper.	Load A-size color paper.	<None>/interact
LOAD A-CVTRANS	Load A-size transparencies.	Load A-size transparencies.	<None>/interact
LOAD A4-SIZE	Load A4-size media.	Load A4-size media.	<None>/interact
LOAD A4-DVPAPER	Load A4-size black and white paper.	Load A4-size black and white paper.	<None>/interact

<b>Printer Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
LOAD A4-CVPAPER	Load A4-size color paper.	Load A4-size color paper.	<None>/interact
LOAD A4-CVTRANS	Load A4-size transparencies.	Load A4-size transparencies.	<None>/interact
LOAD LA-SIZE	Load LA-size media.	Load LA-size media.	<None>/interact
LOAD LA-DVPAPER	Load LA-size black and white paper.	Load LA-size black and white paper.	<None>/interact
LOAD LA-CVPAPER	Load LA-size color paper.	Load LA-size color paper.	<None>/interact
LOAD LA-CVTRANS	Load LA-size transparencies.	Load LA-size transparencies.	<None>/interact
LOAD LA4-SIZE	Load LA4-size media.	Load LA4-size media.	<None>/interact
LOAD LA4-DVPAPER	Load LA4-size black and white paper.	Load LA4-size black and white paper.	<None>/interact
LOAD LA4-CVPAPER	Load LA4-size color paper.	Load LA4-size color paper.	<None>/interact
LOAD LA4-CVTRANS	Load LA4-size transparencies.	Load LA4-size transparencies.	<None>/interact
LOAD XLA-SIZE	Load XLA-size media.	Load XLA-size media.	<None>/interact
LOAD XLA-DVPAPER	Load XLA-size black and white paper.	Load XLA-size black and white paper.	<None>/interact
LOAD XLA-CVPAPER	Load XLA-size color paper.	Load XLA-size color paper.	<None>/interact
LOAD XLA-CVTRANS	Load XLA-size transparencies.	Load XLA-size transparencies.	<None>/interact
LOAD XLA4-SIZE	Load XLA4-size media.	Load XLA4-size media.	<None>/interact
LOAD XLA4-DVPAPE	Load XLA4-size black and white paper.	Load XLA4-size black and white paper.	<None>/interact
LOAD XLA4-CVPAPE	Load XLA4-size color paper.	Load XLA4-size color paper.	<None>/interact
LOAD XLA4-CVTRAN	Load XLA4-size transparencies.	Load XLA4-size transparencies.	<None>/interact
LOAD XLW-SIZE	Load XLW-size media.	Load XLW-size media.	<None>/interact

<b>Printer Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
LOAD XLW-DVPAPER	Load XLW-size black and white paper.	Load XLW-size black and white paper.	<None>/interact
LOAD XLW-CVPAPER	Load XLW-size color paper.	Load XLW-size color paper.	<None>/interact
LOAD 8X10-SIZE	Load 8x10 media.	Load 8x10 media.	<None>/interact
LOAD 8X10-DVFILM	Load 8x10 black and white film.	Load 8x10 black and white film.	<None>/interact
SUPPLY MISSING	The film supply magazine specified for this job is not available.	Film supply not available.	<None>/interact
RIBBON MISSING	Ribbon is missing.	Ribbon is missing.	<None>/interact
RIBBON EMPTY	Ribbon is empty.	Ribbon is empty.	<None>/interact
TOP COVER OPEN	Top cover of printer is open.	Top cover of camera is open.	<None>/interact
-	-	-	-

*Table 51: Additional DICOM Execution Status Infos*

<b>Execution Status info</b>	<b>Description</b>	<b>Message string visible in the Status Bar</b>	<b>Other action for syngo/camera symbol</b>
INVALIDPAGE DES	The specified page layout cannot be printed or other page description errors have been detected.	Film Job cannot be printed on this camera. Queue stopped. Please redirect film job.	<b>Queue for this camera will be STOPPED/queue stopped</b>
INSUFFIC MEMORY	There is not enough memory available to complete this job.	Not enough memory available in camera. Queue stopped. Please continue queue or change camera.	<b>Queue for this camera will be STOPPED/queue stopped</b>
NONE	General printer warning, no specific information is available. Spooling of print jobs to disk is still possible.	-	<None>/idle
-	-	-	-

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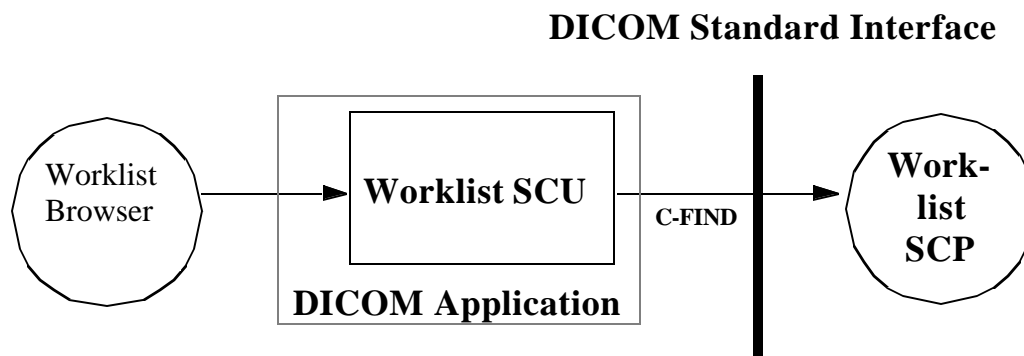
## 6 Implementation Model Worklist

The Worklist Service Class defines an application-level class of service which facilitates the transfer of worklists from the information system to the imaging modality. The worklist is queried by the AE and supplies the SCU with the scheduled tasks which have to be performed on the modality. The MR DICOM worklist application supports the worklist service to act as SCU.

### 6.1 Application Data Flow Diagram

The MR DICOM network implementation is a Windows NT application and acts as SCU for the worklist network service.

*Figure 2: Application data flow diagram*



### 6.2 Functional Definitions of Application Entities

The worklist SCU requests the worklist SCP to perform a match to the keys specified in the C-Find DIMSE service.

The worklist SCP responds to the C-FIND query and scheduled imaging service requests and patient demographic information will be downloaded from the information system to the modality.

### 6.3 Sequencing of real World Activities

The MR acquisition system obtains worklist information regarding scheduled procedures from HIS/RIS and includes this information in the series of the acquired DICOM MR images. If the worklist information is not available from HIS/RIS it will be typed by user during the registration of the patient.

## 6.4 Modality Worklist AE Specification

The Modality Worklist SCU requests that the remote SCP performs a match of all keys specified in the query against the information in its worklist database.

SIEMENS MR DICOM products provide Standard Conformance to the following DICOM V3.0 SOP Class as an SCU:

*Table 52: SOP Classes as an SCU*

SOP Class Name	SOP Class UID
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31

### 6.4.1 Association Establishment Policies

#### 6.4.1.1 General

The configuration of the Siemens DICOM modality worklist application defines the Application Entity Titles, the port numbers and of course the host name and net address.

#### 6.4.1.2 Number of Associations

The Siemens DICOM application initiates one/several association(s) at a time, one for each transfer request being processed.

#### 6.4.1.3 Asynchronous Nature

The Siemens DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

#### 6.4.1.4 Implementation Identifying Information

The Siemens MR DICOM software provides a single Implementation Class UID of

- “1.3.12.2.1107.5.2”

and an Implementation Version Name of

- “MR\_2002B\_VA21A”.

### 6.4.2 Association Initiation Policy

The Modality Worklist SCU establishes an association by using the DICOM association services.

The following DIMSE-C operation is supported as SCU:

- C-FIND

## 6.4.2.1 Real World Activity

### 6.4.2.1.1 Associated Real-World Activity

The associated Real-World activity is to initiate query requests to an SCP by using the DICOM Worklist Information Model.

### 6.4.2.1.2 Proposed Presentation Contexts

The Siemens DICOM application will propose Presentation Contexts as shown in the following table:

**Table 53:** Proposed presentation contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model- FIND	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		

### 6.4.2.1.3 SOP Specific Conformance Statement

#### Search Key Attributes of the Worklist C-FIND

The Siemens DICOM worklist SCU supports worklist queries with all required search keys and several optional search keys.

The following table describes the search keys that the SCU supports for a broad worklist query, which is a query for all tasks scheduled for the own modality or own modality application entity, defined with the following search keys:

**Table 54:** Search Key Attributes in a broad worklist query

Attribute name	Tag	Matching Key Type	query value
<b>Scheduled Procedure Step</b>			
Scheduled Procedure Step Sequence	(0040,0100)	R	
>Scheduled Station AE Title	(0040,0001)	R	Configurable <sup>a</sup> : own AET or "*"

*Table 54: Search Key Attributes in a broad worklist query*

Attribute name	Tag	Matching Key Type	query value
>Scheduled Procedure Step Start Date	(0040,0002)	R	Configurable: inserted in UI <sup>b</sup> or today
>Scheduled Procedure Step Start Time	(0040,0003)	R	Configurable: inserted in UI <sup>c</sup> or zero length
>Modality	(0008,0060)	R	Configurable <sup>a</sup> : own modality or "*"

a. One and only one of the attributes "Modality" and "AE Title" is set to "\*". There is a configuration parameter telling which of them. The other one is always set to the "own" value (i.e. own modality respectively own AE Title).

b. <startDate>-<endDate>

c. <startTime>-<endTime>

The following table describes the search keys that the SCU supports for a patient based worklist query, which is defined by the following search keys:

*Table 55: Search Key Attributes in a patient based worklist query*

Attribute name	Tag	Matching Key Type	query value
<b>Scheduled Procedure Step</b>			
Scheduled Procedure Step Sequence	(0040,0100)	R	
>Scheduled Performing Physician's Name	(0040,0006)	R	inserted in UI or zero length
<b>Requested Procedure</b>			
Requested Procedure ID	(0040,1001)	O	inserted in UI or zero length
<b>Imaging Service Request</b>			
Accession Number	(0008,0050)	O	inserted in UI or zero length
Referring Physician's Name	(0008,0090)	O	inserted in UI or zero length
<b>Visit Status</b>			
Current Patient Location	(0038,0300)	O	inserted in UI or zero length

**Table 55:** Search Key Attributes in a patient based worklist query

Attribute name	Tag	Matching Key Type	query value
<b>Patient Identification</b>			
Patient's Name	(0010,0010)	R	inserted in UI or zero length
Patient ID	(0010,0020)	R	inserted in UI or zero length

**Return Key Attributes used from the Worklist C\_FIND\_RSP**

The Siemens DICOM worklist SCU supports worklist queries with return key attributes of all types. The following table describes the return keys that the SCU supports. Most attributes can be shown in the User Interface (PatientRegistration or PatientBrowser), but in Patient-Browser it is configurable which of them are shown really.

**Table 56:** Modality Worklist C\_FIND\_RSP Return Key Attributes

Attribute name	Tag	Return Key Type	displayed in User Interface
<b>SOP Common</b>			
Specific Character Set	(0008,0005)	1C	-
<b>Scheduled Procedure Step</b>			
Scheduled Procedure Step Sequence	(0040,0100)	1	-
>Scheduled Station AE Title	(0040,0001)	1	yes
>Scheduled Procedure Step Start Date	(0040,0002)	1	yes
>Scheduled Procedure Step Start Time	(0040,0003)	1	yes
>Scheduled Procedure Step End Date	(0040,0004)	3	-
>Scheduled Procedure Step End Time	(0040,0005)	3	-
>Modality	(0008,0060)	1	yes
>Scheduled Performing Physician's Name	(0040,0006)	1	yes
>Scheduled Procedure Step Description	(0040,0007)	1C	yes
>Scheduled Station Name	(0040,0010)	2	yes
>Scheduled Procedure Step Location	(0040,0011)	2	yes

Table 56: Modality Worklist C\_FIND\_RSP Return Key Attributes

Attribute name	Tag	Return Key Type	displayed in User Interface
>Scheduled Action Item Code Sequence	(0040,0008)	1C	-
>>Code Value	(0008,0100)	1C	yes
>>Coding Scheme Designator	(0008,0102)	1C	yes
>>Coding Scheme Version	(0008,0102)	3	yes
>>Code Meaning	(0008,0104)	3	yes
>Pre-Medication	(0040,0012)	2C	yes
>Scheduled Procedure Step ID	(0040,0009)	1	yes
>Requested Contrast Agent	(0032,1070)	2C	yes
>Scheduled Procedure Step Status	(0040,0020)	3	yes
>Comments on the Scheduled Procedure Step	(0040,0400)	3	-
<b>Requested Procedure</b>			
Requested Procedure ID	(0040,1001)	1	yes
Requested Procedure Description	(0032,1060)	1C	yes
Requested Procedure Code Sequence	(0032,1064)	1C	-
>Code Value	(0008,0100)	1C	yes
>Code Scheme Designator	(0008,0102)	1C	yes
>Code Scheme Version	(0008,0103)	3	yes
>Code Meaning	(0008,0104)	3	yes
Study Instance UID	(0020,000D)	1	-
Referenced Study Sequence	(0008,1110)	2	-
>Referenced SOP Class UID	(0008,1150)	1C	-
>Referenced SOP Instance UID	(0008,1155)	1C	-
Requested Procedure Priority	(0040,1003)	2	yes
Patient Transport Arrangements	(0040,1004)	2	-
Reason for the Requested Procedure	(0040,1002)	3	-
Confidentiality Code	(0040,1008)	3	-

Table 56: Modality Worklist C\_FIND\_RSP Return Key Attributes

Attribute name	Tag	Return Key Type	displayed in User Interface
Reporting Priority	(0040,1009)	3	-
Names of Intended Recipients of results	(0040,1010)	3	-
Requested Procedure Comments	(0040,1400)	3	yes
Requested Procedure Location	(0040,1005)	3	-
<b>Imaging Service Request</b>			
Accession Number	(0008,0050)	2	yes
Requesting Physician	(0032,1032)	2	yes
Referring Physician's Name	(0008,0090)	2	yes
Reason for the Imaging Service Request	(0040,2001)	3	-
Imaging Service Request Comments	(0040,2400)	3	yes
Requesting Service	(0032,1033)	3	yes
Issuing Date of Imaging Service Request	(0040,2004)	3	-
Issuing Time of Imaging Service Request	(0040,2005)	3	-
Placer Order Number / Imaging Service Request	(0040,2016)	3	-
Filler Order Number / Imaging Service Request	(0040,2017)	3	-
Order entered by...	(0040,2008)	3	-
Order Enterer's Location	(0040,2009)	3	-
Order Callback Phone Number	(0040,2010)	3	-
<b>Visit Identification</b>			
Admission ID	(0038,0010)	2	yes
Issuer of Admission ID	(0038,0011)	3	-
<b>Visit Status</b>			
Current Patient Location	(0038,0300)	2	yes
<b>Visit Relationship</b>			
Referenced Patient Sequence	(0008,1120)	2	-

Table 56: Modality Worklist C\_FIND\_RSP Return Key Attributes

Attribute name	Tag	Return Key Type	displayed in User Interface
>Referenced SOP Class UID	(0008,1150)	2	-
>Referenced SOP Instance UID	(0008,1155)	2	-
<b>Visit Admission</b>			
Institution Name	(0008,0000)	3	yes
Admitting Diagnoses Description	(0008,1080)	3	yes
<b>Patient Identification</b>			
Patient's Name	(0010,0010)	1	yes
Patient ID	(0010,0020)	1	yes
<b>Patient Demographic</b>			
Patients Birth Date	(0010,0030)	2	yes
Patient's Sex	(0010,0040)	2	yes
Patient's Size	(0010,1020)	3	yes
Patient's Weight	(0010,1030)	2	yes
Confidentiality constraint on patient data	(0040,3001)	2	yes
Patient's Address	(0010,1040)	3	yes
Military Rank	(0010,1080)	3	yes
Ethnic Group	(0010,2160)	3	yes
Patient Comments	(0010,4000)	3	yes
<b>Patient Medical</b>			
Patient State	(0038,0500)	2	yes
Pregnancy Status	(0010,21C0)	2	yes
Medical Alerts	(0010,2000)	2	yes
Contrast Allergies	(0010,2110)	2	yes
Special Needs	(0038,0050)	2	yes
Smoking Status	(0010,21A0)	3	yes
Last Menstrual Date	(0010,21D0)	3	yes
Additional Patient History	(0010,21B0)	3	yes

## Status Codes of the Worklist C-FIND

The worklist SCU interprets following status codes:

*Table 57: C-FIND Response Status*

<b>Service Status</b>	<b>Meaning</b>	<b>Status Codes (0000,0900)</b>
Refused	Out of Resources	A700
	SOP class not supported	0122
Failed	Identifier does not match SOP Class	A900
	Unable to process	C001
Cancel	Matching terminated due to Cancel request	FE00
Success	Matching is complete - No final Identifier is supplied	0000
Pending	Matches are continuing - Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys	FF00
	Matches are continuing - Warning that one or more Optional Keys were not supported for existence and/or matching for this identifier	FF01

# 7 Application Entity Specification

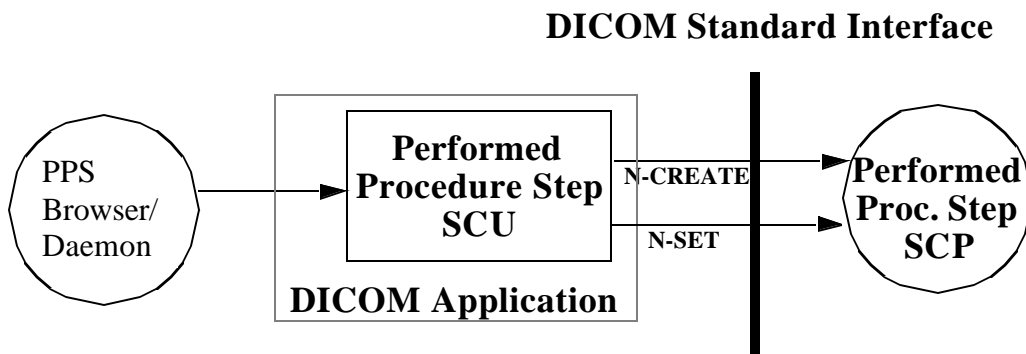
## Procedure Step

The performed procedure step service class defines an application-level class of service which facilitates the transfer of billing and radiation dose information from the imaging modality to the information system. The performed procedure step is sent by the AE and supplies the SCP with the performed tasks on the modality. The DICOM performed procedure step application supports the performed procedure step service to act as SCU.

### 7.0.1 Application Data Flow Diagram

The Siemens DICOM network implementation is a Windows NT application and acts as SCU for the performed procedure step network service.

Figure 3: Application Data Flow Diagram PERFORMED PROCEDURE STEP SCU



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### 7.0.2 Functional Definitions of Application Entities

The performed procedure step SCU informs the performed procedure step SCP about the performed procedure steps examined at the modality in the N-CREATE and N-SET DIMSE service.

The performed procedure step SCP responds to the N-CREATE and N-SET and confirms that it received the information from the modality.

### 7.0.3 Sequencing of real World Activities

not applicable.

## 7.1 Modality Performed Procedure Step AE Specification

The Modality Performed Procedure Step SCU informs the remote SCP about the performed examinations at the modality.

SIEMENS MR DICOM products provide Standard Conformance to the following DICOM V3.0 SOP Class as an SCU:

*Table 58: SOP Classes as an SCU*

SOP Class Name	SOP Class UID
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3

### 7.1.1 Association Establishment Policies

#### 7.1.1.1 General

The configuration of the Siemens DICOM Performed Procedure Step application defines the Application Entity Titles, the port numbers and of course the host name and net address.

#### 7.1.1.2 Number of Associations

The Siemens DICOM application initiates one/several association(s) at a time, one for each transfer request being processed.

#### 7.1.1.3 Asynchronous Nature

The Siemens DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

#### 7.1.1.4 Implementation Identifying Information

The Siemens DICOM software provides a single Implementation Class UID of

- “1.3.12.2.1107.5.2”

and an Implementation Version Name of

- “MR\_2002B\_VA21A”.

### 7.1.2 Association Initiation Policy

The Modality Performed Procedure Step SCU establishes an association by using the DICOM association services.

The following DIMSE-N operations are supported as SCU:

- N-CREATE
- N-SET

### 7.1.2.1 Real World Activity

#### 7.1.2.1.1 Associated Real-World Activity

The associated Real-World activity is to send examination information to an SCP by using the DICOM Modality Performed Procedure Step Service.

#### 7.1.2.1.2 Proposed Presentation Contexts

The Siemens DICOM application will propose Presentation Contexts as shown in the following table:

**Table 59:** Proposed presentation contexts

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.1		
		DICOM Explicit VR Big Endian Transfer Syntax	1.2.840.10008.1.2.2		

#### 7.1.2.1.3 SOP Specific Conformance Statement

##### Attributes used for the Performed Procedure Step N-CREATE

The Siemens DICOM performed procedure step SCU informs the remote SCP when the examination of a scheduled procedure step will be performed. The N-CREATE message is sent when the examination is started. The following table describes the supported attributes for a N-CREATE message

.

**Table 60:** Performed Procedure Step N-CREATE Attributes

Attribute name	Tag	Required Type	Value
<b>SOP Common</b>			
Specific Character Set	(0008,0005)	1C	from MWL or created

**Table 60:** Performed Procedure Step N-CREATE Attributes

Attribute name	Tag	Required Type	Value
<b>Performed Procedure Step Relationship</b>			
Scheduled Step Attribute Sequence	(0040,0270)	1	
>Study Instance UID	(0020,000D)	1	from MWL or created
>Referenced Study Sequence	(0008,1110)	2	from MWL or zero length
>>Referenced SOP Class UID	(0008,1150)	1C	
>>Referenced SOP Instance UID	(0008,1155)	1C	
>Accession Number	(0008,0050)	2	from MWL or user input
>Placer Order Number / Imaging Service Request	(0040,2016)	3	from MWL or zero length
>Filler Order Number / Imaging Service Request	(0040,2017)	3	from MWL or zero length
>Requested Procedure ID	(0040,1001)	2	from MWL or user input
>Requested Procedure Description	(0032,1060)	2	from MWL or zero length
>Scheduled Procedure Step ID	(0040,0009)	2	from MWL or zero length
>Scheduled Procedure Step Description	(0040,0007)	2	from MWL or zero length
>Scheduled Action Item Code Sequence	(0040,0008)	2	from MWL or zero length
>>Code Value	(0008,0100)	1C	
>>Coding Scheme Designator	(0008,0102)	1C	
>>Code Scheme Version	(0008,0103)	3	
>>Code Meaning	(0008,0104)	3	
Patient's Name	(0010,0010)	2	from MWL or user input
Patient ID	(0010,0020)	2	from MWL or user input or created

**Table 60:** Performed Procedure Step N-CREATE Attributes

Attribute name	Tag	Required Type	Value
Patients Birth Date	(0010,0030)	2	from MWL or user input
Patient's Sex	(0010,0040)	2	from MWL or user input
Referenced Patient Sequence	(0008,1120)	2	from MWL or zero length
>Referenced SOP Class UID	(0008,1150)	1C	
>Referenced SOP Instance UID	(0008,1155)	1C	
<b>Performed Procedure Step Information</b>			
Performed Procedure Step ID	(0040,0253)	1	from SPS ID or created
Performed Station AE Title	(0040,0241)	1	own AE Title
Performed Station Name	(0040,0242)	2	own hostname
Performed Location	(0040,0243)	2	from SPS Location or zero length
Performed Procedure Step Start Date	(0040,0244)	1	created
Performed Procedure Step Start Time	(0040,0245)	1	created
Performed Procedure Step Status	(0040,0252)	1	IN PROGRESS
Performed Procedure Step Description	(0040,0254)	2	from SPS Description or zero length
Performed Procedure Type Description	(0040,0255)	2	zero length
Procedure Code Sequence	(0008,1032)	2	from Requested Procedure Code or zero length
>Code Value	(0008,0100)	1C	
>Code Scheme Designator	(0008,0102)	1C	
>Code Scheme Version	(0008,0103)	3	
>Code Meaning	(0008,0104)	3	
Performed Procedure Step End Date	(0040,0250)	2	zero length
Performed Procedure Step End Time	(0040,0251)	2	zero length

**Table 60:** Performed Procedure Step N-CREATE Attributes

Attribute name	Tag	Required Type	Value
<b>Image Acquisition Results</b>			
Modality	(0008,0060)	1	MR
Study ID	(0020,0010)	2	from Requested Procedure ID or created
Performed Action Item Code Sequence	(0040,0260)	2	from Scheduled Action Item Code SQ or zero length
>Code Value	(0008,0100)	1C	
>Code Scheme Designator	(0008,0102)	1C	
>Code Scheme Version	(0008,0103)	3	
>Code Meaning	(0008,0104)	3	
Performed Series Sequence	(0040,0340)	2	
>Performing Physicians's Name	(0008,1050)	2C	from MWL or user input
>Operator's Name	(0008,1070)	2C	user input
>Series Instance UID	(0020,000E)	1C	created
>Series Description	(0008,103E)	2C	zero length
>Retrieve AE Title	(0008,0054)	2C	zero length
>Referenced Image Sequence	(0008,1140)	2C	zero length
>Referenced Standalone SOP Instance Sequence	(0040,0220)	2C	zero length

**Status Codes of the Performed Procedure Step N-CREATE**

The Performed Procedure Step SCU interprets the following status values:

*Table 61: N-SET Response Status*

Service Status	Meaning	Status Codes (0000,0900)
Failure	Processing Failure	0110
	No such attribute	0105
	Invalid attribute value	0106
	Duplicate SOP Instance	0111
	No such SOP Instance	0112
	No such SOP class	0118
	Class instance conflict	0119
	Missing attribute	0120
	Missing attribute value	0121
	Resource limitation	0213
Success	Successful Operation	0000

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**Attributes used for the Performed Procedure Step N-SET**

The Siemens DICOM performed procedure step SCU informs the remote SCP about the performed examination and its status. The N-SET message is only sent once when the examination is finished with status "COMPLETED" or when the examination could not be completed with status "DISCONTINUED". The following table describes the supported attributes for a N-SET message.

*Table 62: Performed Procedure Step N-SET Attributes*

Attribute name	Tag	Required Type	Value
<b>Performed Procedure Step Information</b>			
Performed Procedure Step Status	(0040,0252)	3	created
Performed Procedure Step Description	(0040,0254)	3	from SPS Description or user input

**Table 62:** *Performed Procedure Step N-SET Attributes*

<b>Attribute name</b>	<b>Tag</b>	<b>Required Type</b>	<b>Value</b>
Performed Procedure Type Description	(0040,0255)	3	user input
Procedure Code Sequence	(0008,1032)	3	from Requested Procedure Code
>Code Value	(0008,0100)	1C	
>Code Scheme Designator	(0008,0102)	1C	
>Code Scheme Version	(0008,0103)	3	
>Code Meaning	(0008,0104)	3	
Performed Procedure Step End Date	(0040,0250)	3	created
Performed Procedure Step End Time	(0040,0251)	3	created
<b>Image Acquisition Results</b>			
Performed Action Item Code Sequence	(0040,0260)	3	from Scheduled Action Item Code SQ
>Code Value	(0008,0100)	1C	
>Code Scheme Designator	(0008,0102)	1C	
>Code Scheme Version	(0008,0103)	3	
>Code Meaning	(0008,0104)	3	
Performed Series Sequence	(0040,0340)	3	
>Performing Physicians's Name	(0008,1050)	2C	from MWL or user input
>Protocol Name	(0018,1030)	1C	from acquisition
>Operator's Name	(0008,1070)	2C	user input
>Series Instance UID	(0020,000E)	1C	created
>Series Description	(0008,103E)	2C	from acquisition
>Retrieve AE Title	(0008,0054)	2C	from Storage Commitment RSP or zero length
>Referenced Image Sequence	(0008,1140)	2C	created
>>Referenced SOP Class UID	(0008,1150)	1C	
>>Referenced SOP Instance UID	(0008,1155)	1C	

**Table 62:** Performed Procedure Step N-SET Attributes

Attribute name	Tag	Required Type	Value
>Referenced Standalone SOP Instance Sequence	(0040,0220)	2C	zero length
Film Consumption Sequence	(0040,0321)	3	filming consumption during acquisition
>Number of Films	(2100,0170)	3	filled from filming
>Medium Type	(2000,0030)	3	filled from filming
>Film Size ID	(2010,0050)	3	filled from filming
Billing Supplies and Devices Sequence	(0040,0324)	3	contrast supply
>Billing Item Sequence	0040,0296)	3	contrast medium filled from acquisition
>>Code Value	(0008,0100)	1C	contrast code user input
>>Code Scheme Designator	(0008,0102)	1C	MPPS configuration, e.g. SNOMED3
>>Code Scheme Version	(0008,0103)	3	MPPS configuration, e.g SNOMED version 3
>>Code Meaning	(0008,0104)	3	contrast ingredient user input, e.g. GADOLINIUM
>Quantity Sequence	(0040,0293)	3	contrast quantity filled from acquisition
>>Quantity	(0040,0294)	3	user input e.g. 0.60
>>Measuring Units Sequence	(0040,0295)	3	filled from acquisition
>>>Code Value	(0008,0100)	1C	cm3
>>>Code Scheme Designator	(0008,0102)	1C	UCUM
>>>Code Scheme Version	(0008,0103)	3	1.4
>>>Code Meaning	(0008,0104)	3	cm3

### Status Codes of the Performed Procedure Step N-SET

The Performed Procedure Step SCU interprets the following status values:

*Table 63: N-SET Response Status*

<b>Service Status</b>	<b>Meaning</b>	<b>Status Codes (0000,0900)</b>
Failure	Processing Failure: Performed Procedure Step Object may no longer be updated	0110
	No such attribute	0105
	Invalid attribute value	0106
	No such SOP Instance	0112
	Invalid object instance	0117
	No such SOP class	0118
	Class instance conflict	0119
	Missing attribute value	0121
	Resource limitation	0213
Success	Successful Operation	0000

## 8 Communication Profiles

### 8.1 Supported Communication Stacks

The Siemens MR DICOM application provide DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

#### 8.1.1 OSI Stack

not supported.

#### 8.1.2 TCP/IP Stack

The Siemens MR DICOM application uses the TCP/IP stack from the Windows NT system upon which it executes. It uses the MergeCOM-3 subroutine library from Merge Technologies Inc.

##### 8.1.2.1 API

The Siemens MR DICOM application uses the MergeCOM library that is based on a TCP/IP socket interface.

##### 8.1.2.2 Physical Media Support

The Siemens MR DICOM application is indifferent to the physical medium over which TCP/IP executes; it inherits this from the Windows NT system upon which it executes.

#### 8.1.3 Point-to-Point Stack

not supported.

# 9 Extensions/Specializations/ Privatizations

## 9.1 Standard Extended/Specialized/Private SOPs

### 9.1.1 Standard Extensions of all SOP Classes

The following tables list the data dictionary of all DICOM IOD attributes where the DICOM standard definitions are extended:

*Table 64: Standard Extensions of all SOP Classes*

Attribute Name	Tag	Private Creator	Type	Notes
Image Type	(0008,0008)	-	1	additional Defined Terms: <u>Online reconstruction</u> R - real image M - magnitude image P - phase image  <u>Diffusion</u> ADC - apparent diffusion image  <u>Perfusion</u> TTP - time to peak map image PBP - percent of baseline at peak GBP - global average bolus curve plotted RELCBV - relative cerebral blood volume RELCBF - relative cerebral blood flow RELMIT - relative mean transit time  <u>Angio</u> MAG - magnitude image MSUM - magnitude sum image  <u>fMRI</u> MEAN - mean value image TTEST - student's t-test image MOSAIC - multi-frame mosaic image COR - correlation image

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**Table 64:** Standard Extensions of all SOP Classes

Attribute Name	Tag	Private Creator	Type	Notes
Image Type	(0008,0008)		1	<p><u>Inline reconstruction</u>  MIP_SAG - inline MIP sagittal  MIP_COR - inline MIP coronal  MIP_TRA - inline MIP transversal  TMIP - temporal inline MIP  TMIP_SAG - temporal inline MIP sagittal  TMIP_COR - temporal inline MIP coronal  TMIP_TRA - temporal inline MIP transversal  STDDEV_SAG - inline standard deviation sagittal  STDDEV_COR - inline standard deviation coronal  STDDEV_TRA - inline standard deviation transversal  NORM - normalized image  ND - not distorted corrected  DIS2D - distortion correction 2D  DIS3D - distortion correction 3D  RETRO - retrospective Gating  MOCO - motion correction  FILTERED - inline filter  PROJECTION IMAGE - projection image</p> <p><u>Dynamic analysis</u>  ADD - Addition image  MEAN - Mean value image  COR - Correlation image  DIFFER - Differentiation image  DIFFUS - Diffusion image  DIV - Division image  INT - Integration image  LOG - Logarithm image  MULT - Multiplication image  SLOPE - Slope image  SDEV - standard deviation image  SUB - Substraktion image  T1 - T1 image  PDT1 - T1 weighted proton density  T2 - T2 image  PDT2 - T2 weighted proton density  TTP - Time to peak image  TTEST - difference image between groups</p>

**Table 64:** Standard Extensions of all SOP Classes

Attribute Name	Tag	Private Creator	Type	Notes
Image Type	(0008,0008)		1	CV(1-20) - Context Vision filter  POSDISP - Position display image GSP - Graphical slice position image SPEC - spectroscopy image  CSA 3D EDITOR - 3D editor CSA 3D FLY PATH - fly path through CSA 3D FLY VRT - fly through volume rendering technique CSA 3D FUSION - fusion image CSA AVERAGE - Average image CSA BLACK IMAGE - Black image CSA RESAMPLED - resampled image CSA MIP - MIP image CSA MIP THIN - MIP image CSA MPR - MPR image CSA MPR THIN - MPR image CSA MPR THICK - MPR image CSA MPR CURVED - MPR curved image CSA SSD - SSD image CSA SUBTRACT - Subtract image
Scan Options	(0018,0022)	-	2	additional Defined Terms: RG CG SP FS WS WE FE IR SR DB GX L(x) SAT(y) MT RT CT
Patient Position	(0018,5100)	-	2C	additional Defined Terms for the Magnetom Open: HLS HLP FLS FLP HLDL HLDR FLDL FLDR

All SOP classes may contain additional type 3 attributes which are defined in another IOD than the MR IOD.

This is the case for example for

- Rescale Slope (0028,1053)
- Rescale Intercept (0028,1052)

which are also used in the MR IOD.

## 9.1.2 Private Elements for Storage SOP Classes

The following private attributes are defined by Siemens MedCom based DICOM applications.

### 9.1.2.1 Registry of DICOM Data Elements

<b>Tag</b>	<b>Private Owner Code</b>	<b>Name</b>	<b>VR</b>	<b>VM</b>
(0029,xx08)	SIEMENS CSA HEADER	CSA Image Header Type	CS	1
(0029,xx09)	SIEMENS CSA HEADER	CSA Image Header Version	LO	1
(0029,xx10)	SIEMENS CSA HEADER	CSA Image Header Info	OB	1
(0029,xx18)	SIEMENS CSA HEADER	CSA Series Header Type	CS	1
(0029,xx19)	SIEMENS CSA HEADER	CSA Series Header Version	LO	1
(0029,xx20)	SIEMENS CSA HEADER	CSA Series Header Info	OB	1
(0029,xx08)	SIEMENS CSA NON-IMAGE	CSA Data Type	CS	1
(0029,xx09)	SIEMENS CSA NON-IMAGE	CSA Data Version	LO	1
(0029,xx10)	SIEMENS CSA NON-IMAGE	CSA Data Info	OB	1
(0029,xx08)	SIEMENS MEDCOM HEADER	MedCom Header Type	CS	1
(0029,xx09)	SIEMENS MEDCOM HEADER	MedCom Header Version	LO	1
(0029,xx10)	SIEMENS MEDCOM HEADER	MedCom Header Info	OB	1
(0029,xx20)	SIEMENS MEDCOM HEADER	MedCom History Information	OB	1
(0029,xx31)	SIEMENS MEDCOM HEADER	PMTF Information 1	LO	1
(0029,xx32)	SIEMENS MEDCOM HEADER	PMTF Information 2	UL	1
(0029,xx33)	SIEMENS MEDCOM HEADER	PMTF Information 3	UL	1
(0029,xx34)	SIEMENS MEDCOM HEADER	PMTF Information 4	CS	1
(0029,xx08)	SIEMENS MEDCOM OOG	MEDCOM OOG Type	CS	1
(0029,xx09)	SIEMENS MEDCOM OOG	MEDCOM OOG Version	LO	1
(0029,xx10)	SIEMENS MEDCOM OOG	MEDCOM OOG Info	OB	1
<b>Tag</b>	<b>Private Owner Code</b>	<b>Name</b>	<b>VR</b>	<b>VM</b>
(7FE1,xx10)	SIEMENS CSA NON-IMAGE	CSA Data	OB	1

The next subsections will explain in which IODs these private data elements are used.

## 9.1.2.2 All MedCom Supported Image SOP Classes

### 9.1.2.2.1 extended Image IOD Module Table

Table 65: CSA Image IOD Modules

IE	Module	Usage	Note
Patient	Patient	M	
Study	General Study	M	
	Patient Study	U	
Series	General Series	M	
Equipment	General Equipment	U	
Image	General Image	M	
	Image Pixel	M	
	IOD specific modules	M/U	depends on the IOD
	CSA Image Header	U	
	CSA Series Header	U	
	MEDCOM Header	U	private History information
	MEDCOM OOG	U	if object graphics is attached to image
	SOP Common	M	

### 9.1.2.2.2 CSA Image Header Module

The table in this section contains private IOD Attributes that describe the CSA Image Header.

Table 66: CSA Image Header Module

Attribute Name	Tag	Private Creator	Type	Notes
CSA Image Header Type	(0029,xx08)	SIEMENS CSA HEADER	1	CSA Image Header identification characteristics. Defined Terms: <NUM 4 = NUMARIS/4 > <SOM 5 = SOMARIS/5 >
CSA Image Header Version	(0029,xx09)	SIEMENS CSA HEADER	3	Version of CSA Image Header Info (0029,xx10) format.
CSA Image Header Info	(0029,xx10)	SIEMENS CSA HEADER	3	product dependent information.

### 9.1.2.2.3 CSA Series Header Module

The table in this section contains private IOD Attributes that describe the CSA Series Header.

*Table 67: CSA Series Header Module*

Attribute Name	Tag	Private Creator	Type	Notes
CSA Series Header Type	(0029,xx18)	SIEMENS CSA HEADER	1	CSA Series Header identification characteristics. Defined Terms: <NUM 4 = NUMARIS/4> <SOM 5 = Somaris/5
CSA Series Header Version	(0029,xx19)	SIEMENS CSA HEADER	3	Version of CSA Series Header Info (0029,xx20) format.
CSA Series Header Info	(0029,xx20)	SIEMENS CSA HEADER	3	product dependent information.

### 9.1.2.2.4 MEDCOM Header Module

The table in this section contains private IOD Attributes that describe MEDCOM Header.

*Table 68: MEDCOM Header Module*

Attribute Name	Tag	Private Creator	Type	Notes
MedCom Header Type	(0029,xx08)	SIEMENS MED-COM HEADER	1C	MedCom Header identification characteristics. Defined Terms: MEDCOM 1 Required if MedCom Header Info (0029,xx10) present.
MedCom Header Version	(0029,xx09)	SIEMENS MED-COM HEADER	2C	Version of MedCom Header Info (0029,xx10) format. Required if MEDCOM Header Info (0029,xx10) present.
MedCom Header Info	(0029,xx10)	SIEMENS MED-COM HEADER	3	Manufacturer model dependent information. The value of the attribute MedCom Header Info (0029,xx10) can be build up in each user defined format.
MedCom History Information	(0029,xx20)	SIEMENS MED-COM HEADER	3	MedCom defined Patient Registration history information. See 9.1.2.2.4.1.
PMTF Information 1	(0029,xx31)	SIEMENS MED-COM HEADER	3	Transformation Information
PMTF Information 2	(0029,xx32)	SIEMENS MED-COM HEADER	3	Transformation Information

*Table 68: MEDCOM Header Module*

Attribute Name	Tag	Private Creator	Type	Notes
PMTF Information 3	(0029,xx33)	SIEMENS MED-COM HEADER	3	Transformation Information
PMTF Information 4	(0029,xx34)	SIEMENS MED-COM HEADER	3	Transformation Information

### 9.1.2.2.4.1 MEDCOM History Information

The value of the attribute MEDCOM History Information (0029,xx20) is defined in the following way:

*Table 69: MEDCOM History Information*

Part	Name	Type	Bytes	Notes
header	Identifier	string	32	always "CSA HISTORY"
	Version	string	32	e.g. "V1.10"
> n items	Class Name	string	64	
	Modification String	string	1024	

### 9.1.2.2.5 MEDCOM OOG Module

The table in this section contains private IOD Attributes that describe MEDCOM Object Oriented Graphics (OOG). This module is used when object graphics is drawn on the image and stores the properties of the graphics objects (Line, Circle, Rectangle, Arrow, and so on). So the graphics objects will remain re-animatable even if such an image is transferred via DICOM C-Store SOP class..

*Table 70: MEDCOM OOG Module*

Attribute Name	Tag	Private Creator	Type	Notes
MedCom OOG Type	(0029,xx08)	SIEMENS MED-COM OOG	1	MEDCOM Object Oriented Graphics (OOG) identification characteristics. Defined Terms: MEDCOM OOG 1
MedCom OOG Version	(0029,xx09)	SIEMENS MED-COM OOG	3	Version of MEDCOM OOG Info (0029,xx10) format.
MedCom OOG Info	(0029,xx10)	SIEMENS MED-COM OOG	3	MEDCOM Object Oriented Graphics (OOG) data.

The graphics objects are also stored in one Image overlay plane for compatibility with other products which don't support the OOG module. Any system which does not support this OOG module has to remove these private attributes when modifying the image overlay data.

## 9.1.3 Private SOP class CSA Non-Image

This chapter includes the definition of the Siemens AG B Med defined private Non-Image Object (called CsaNonImage IOD). The focus of this private Non-Image Object is to address the requirement for non-image data sets found in SynGo based applications.

The Non-Image Information Object Definition specifies data sets that are converted from a non-DICOM format to a modality independent DICOM format.

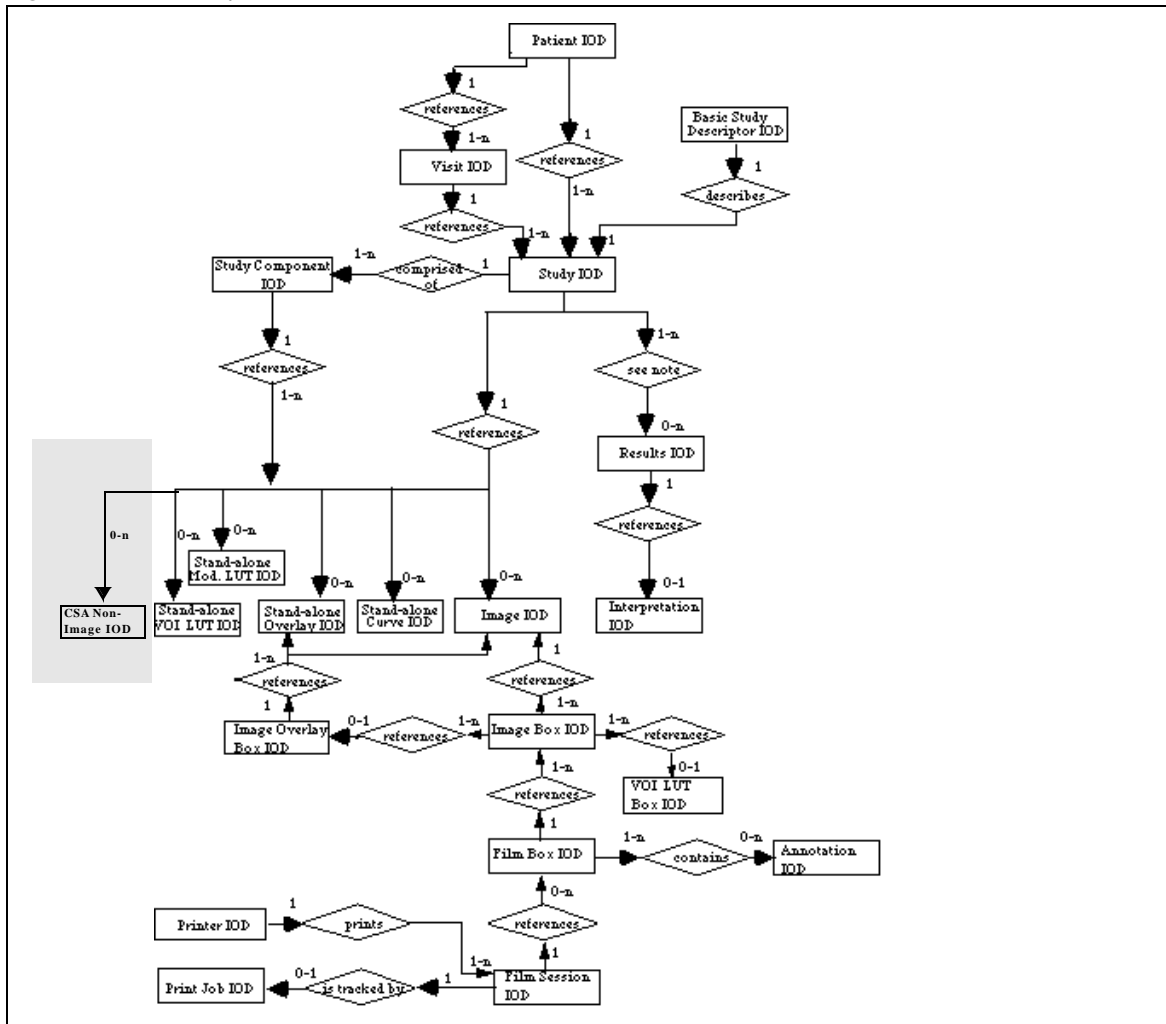
Examples of such manufacturer model dependent data sets are:

- MR Raw Data
- MR Spectroscopy Data

### 9.1.3.1 CSA Non-Image IOD Entity Relationship Model

The E-R model in [DICOM] A.1.2 depicts those components of the DICOM Information Model which directly refer to the CSA Non-Image IOD. The frame of reference IE, overlay IE, modality look up table IE, VOI lookup table IE and curve IE are not components of the CSA Non-Image IOD.

Figure 4: DICOM Information Model



### 9.1.3.2 CSA Non-Image IOD Module Table

Table 71: CSA Non-Image IOD Modules

IE	Module	Usage
Patient	Patient	M
Study	General Study	M
	Patient Study	U
Series	General Series	M
Equipment	General Equipment	U
CSA	CSA Image Header	U
	CSA Series Header	U
	MEDCOM Header	U
	MEDCOM OOG	U
	CSA Non-Image	M
	SOP Common	M

### 9.1.3.3 CSA Non-Image Module

The table in this section contains private IOD Attributes that describe CSA Non-Images.

Table 72: CSA Non-Image Module

Attribute Name	Tag	Private Creator	Type	Notes
Image Type	(0008,0008)	-	3	Image identification characteristics.
Acquisition Date	(0008,0022)	-	3	The date the acquisition of data that resulted in this data set started.
Acquisition Time	(0008,0032)	-	3	The time the acquisition of data that resulted in this data set started.
Derivation Description	(0008,2111)	-	3	A text description of how this data set was derived.
Acquisition Number	(0020,0012)	-	3	A number identifying the gathering of data over a period of time which resulted in this data set.
CSA Data Type	(0029,xx08)	SIEMENS CSA NON-IMAGE	1	CSA Data identification characteristics. Defined Terms: RAW DATA NUM 4 = NUMARIS/4 Raw Data SPEC NUM 4 = NUMARIS/4 Spectroscopy RAW DATA SOM 5 = SOMARIS/5 Raw Data BSR REPORT = BSR Study Report Data
CSA Data Version	(0029,xx09)	SIEMENS CSA NON-IMAGE	3	Version of CSA Data Info (0029,xx10) format and CSA Non-Image Data (7FE1,xx10) format.

*Table 72: CSA Non-Image Module*

<b>Attribute Name</b>	<b>Tag</b>	<b>Private Creator</b>	<b>Type</b>	<b>Notes</b>
CSA Data Info	(0029,xx10)	SIEMENS CSA NON-IMAGE	3	Information to describe the CSA Data (7FE1,xx10). The value of the attribute CSA Data Info (0029,xx10) can be build up in each user defined format.
CSA Data	(7FE1,xx10)	SIEMENS CSA NON-IMAGE	2	Binary data as byte stream.

## 9.2 Private Transfer Syntaxes

none

# 10 Configuration

## 10.1 AE Title / Presentation Address Mapping

To ensure unique identification the hostname should be part of the AE Titles, abbreviated AETs. 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 the DICOM standard. An example name is HRI\_station4.

### Local AE Titels and Presentation Addresses

The local AETs can be configured using the Service application.

The following AETs can be entered:

- One common AET for Storage AE, Storage Commitment AE and Query/Retrieve AE.
- One AET for Modality Worklist AE.
- One AET for Print AE

Storage and Query/Retrieve SCP listen on port 104

### Remote AE Titles and Presentation Addresses

For remote AETs, host names, IP addresses and port numbers can be configured using the Service application. For each AET a list of supported services can also be configured.

## 10.2 Configurable Parameters

### 10.2.1 Storage, Storage Commitment and Query Retrieve

The Service application can be used to set the AETs, port numbers, host names, IP addresses and capabilities for the remote nodes' (SCP's). The user can select transfer syntaxes, compression types and query models for each SCP separately.

#### Additional configurable parameters for Storage Commitment are:

##### When acting as SCU:

- flag to indicate whether the association will be kept open to receive the response or to close the association and be prepared to receive the response on another association.
- time-out which defines how long the association of N-ACTION is kept to receive a N-EVENT-REPORT on the same association.
- time-out for N-EVENT-REPORT (applicability of transaction UID) (default 1 h).

##### When acting as SCP:

- flag to indicate if an archive system is installed

## 10.2.2 Print

The Service application can be used to configure the SCP. AET, host name, IP address and port number can be set.

## 10.2.3 Modality Worklist

The Service application can be used to set the AETs, port numbers, host names, IP addresses, capabilities and time-outs for the remote nodes' (SCP's)

### Additional configurable parameters for Modality Worklist Query are:

- Query Waiting time - the time to wait for the C-FIND-RSP after sending the C-FIND-RQ (default 20 sec.)
- Max Query Match Number - the maximum number of entries accepted in one worklist (default is 200)
- Query Interval: the time between two C-FIND-RQ to the Hospital Information system (default is 60 min.)
- Broad Worllist Query behaviour: two values are defined:
  - Set the AE Title search attribute to the own AE Title, and the Modality search attribute to "\*".
  - Set the Modality search attribute to the own modality and the AE Title search attribute to "\*".

## 10.3 Default Parameters

- maximal PDU size is set to 28672 Bytes
- time-out for accepting/rejecting an association request: 60 s
- time-out for responding to an association open/close request: 60 s
- time-out for accepting a message over network: 60 s
- time-out for waiting for data between TCP/IP-packets: 60 s

The Time-outs for waiting for a Request/Response message from the remote node are as following:

- for Storage SCP/SCU: 600 s
- for Storage Commitment SCU:
  - time-out for Response to N-ACTION: 600 s
  - time-out for N-EVENT-REPORT: configurable, see section 10.2 on page 131
- for Query/Retrieve SCP/SCU: 600 s
- for Modality Worklist SCU: configurable, see section 10.2 on page 131

- for Print Management SCU:  
time-out for Response to N-SET-RQ: 240 s  
time-out for Response to other Requests: 60 s

---

# 11 Support of Extended Character Sets

The Siemens MR DICOM application supports the ISO 8859 Latin 1 (ISO-IR 100) character set, the Japanese language sets JIS X 0201 (ISO-IR 13 Japanese katakana) and the same family with code extensions.

For international versions the following character sets are supported:

Single-Byte character set:

- ISO\_IR 6
- ISO\_IR 100
- ISO\_IR 13 (Japanese Katakana+Romaji JIS X 0201)

Single-Byte character set with code extensions:

- ISO 2022 IR 6
- ISO 2022 IR 100
- ISO 2022 IR 13 (Japanese Katakana+Romaji JIS X 0201)

# syngo MR

## DICOM Conformance Statement

### Part II - Media Storage



# 12 Introduction

## 12.1 Purpose

This DICOM Conformance Statement is written according to part PS 3.2 of [1].

The applications described in this conformance statement are the SIEMENS <product> DICOM off-line media applications. The Siemens MR DICOM off-line media storage service implementation acts as FSC, FSU and/or FSR for the specified application profiles and the related SOP Class instances.

## 12.2 Scope

This DICOM Conformance Statement refers to SIEMENS syngo MR products. The following table relates software names to SIEMENS syngo MR products.

*Table 73: Siemens MR DICOM Products*

Software Name	SIEMENS syngo MR Product
Syngo MR 2002B	Magnetom Symphony
Syngo MR 2002B	Magnetom Harmony
Syngo MR 2002B	Magnetom Concerto
Syngo MR 2002B	Magnetom Sonata
Syngo MR 2002B	Magnetom Allegra
Syngo MR 2002B	Magnetom Trio

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## 12.3 Definitions, Abbreviations

### 12.3.1 Definitions

DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
DIMSE-C	DICOM Message Service Element with Composite information objects

### 12.3.2 Abbreviations

ACR	American College of Radiology
AE	DICOM Application Entity
ASCII	American Standard Code for Information Interchange
DB	Database

DCS	DICOM Conformance Statement
FSC	File Set Creator
FSR	File Set Reader
FSU	File Set Updater
IOD	DICOM Information Object Definition
ISO	International Standard Organization
R	Required Key Attribute
NEMA	National Electrical Manufacturers Association
O	Optional Key Attribute
PDU	DICOM Protocol Data Unit
RWA	Real-World Activity
U	Unique Key Attribute

## 12.4 References

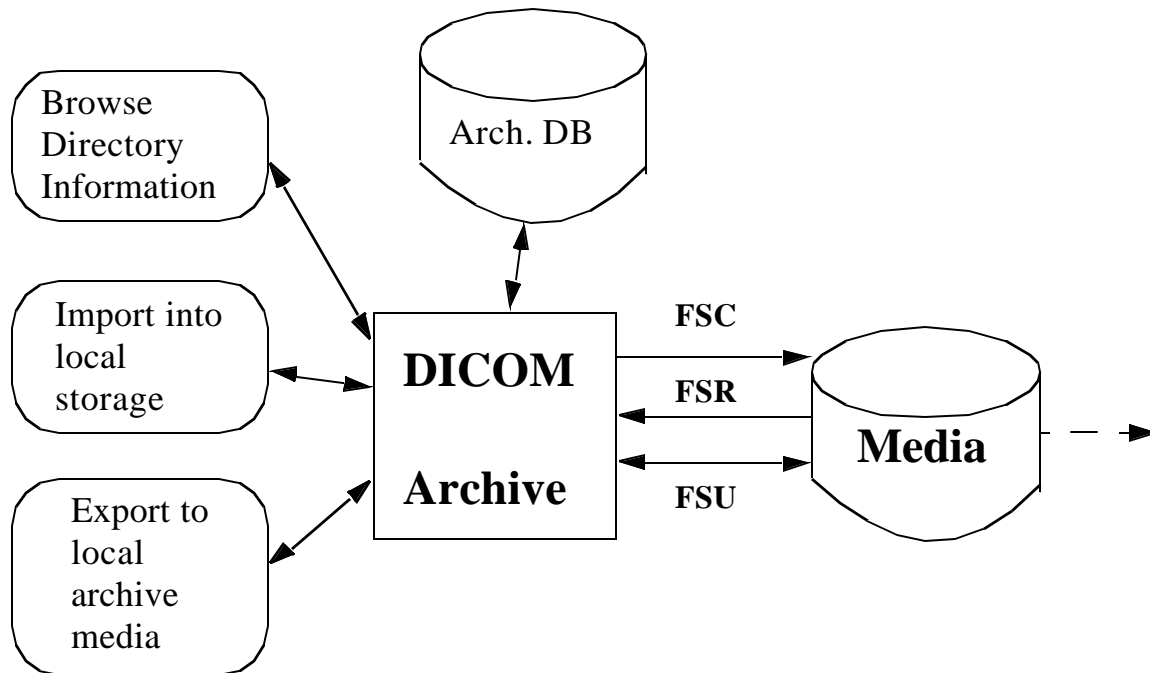
- [2] Digital Imaging and Communications in Medicine (DICOM) 3.0, NEMA PS 3.10-12, 2001

## 12.5 Connectivity and Interoperability

The implementation of the Siemens DICOM interface has been carefully tested to assure correspondence with this Conformance Statement. But the Conformance Statement and the DICOM standard does not guarantee interoperability of Siemens modalities and modalities of other vendors. The user must compare the relevant Conformance Statements and if a successful interconnection should be possible, the user is responsible to specify an appropriate test suite and to validate the interoperability, which is required. A network environment may need additional functions out of the scope of DICOM.

# 13 Implementation Model

## 13.1 Application Data Flow Diagram



The DICOM archive application will serve as an interface to the CD-R or MOD off-line medium device. It serves interfaces to include the off-line media directory into the browser and to copy SOP instances to a medium or retrieve SOP Instances from medium into local storage.

The DICOM Archive application will support CD-R and MOD media (see Table 74:).

The FSU role will update new SOP Instances only to media with pre-existing File-sets conforming to the Application Profiles supported.

The contents of the DICOMDIR will be temporarily stored in Archive-Database.

## 13.2 Functional definitions of AE's

The syngo MR product DICOM off-line media storage application consists of the DICOM Archive application entity serving all interfaces to access off-line media. The DICOM Archive application is capable of

1. creating a new File-set onto an unwritten medium.
2. updating an existing File-set by writing new SOP Instances onto the medium.
3. copying SOP Instances from the medium onto local storage

4. reading the File-set's DICOMDIR information temporarily into database and pass it to display applications.

### **13.3 Sequencing of Real World Activities**

The DICOM Archive application will not perform updates before the Directory information of the DICOMDIR is completely read.

### **13.4 File Meta Information Options**

The Implementation Class UID is:

- "1.3.12.2.1107.5.2"

and an Implementation Version Name of

- "MR\_2002B\_VA21A".

# 14 AE Specifications

## 14.1 DICOM Archive Specification

The DICOM Archive provides Standard conformance to Media Storage Service Class (Interchange Option).

**Table 74:** Application profiles, Activities, and Roles for DICOM Archive

Application Profiles Supported	Real World Activity	Role	SC Option
STD-GEN-CD	Browse Directory Information	FSR	Interchange
STD-CTMR-CD	Import into local Storage	FSR	Interchange
STD-XABC-CD	Export to local archive media	FSC,FSU	Interchange
STD-XA1K-CD			
TD-US-zz-yF-xxxxxx <sup>a</sup>			
STD-WVFM-GEN-FD			

a. All combinations of the following values for zz, yF and xxxxxx are supported:

'yF' can take two values: SF for Single Frame and MF for Multi Frame.

'zz' can take three values: ID (Image Display), SC(Spatial Calibration) and CC (Combined Calibration)

xxxxxx can take following values: FLOP and CDR.

Configuration of uncompressed Transfer Syntax for export will result in compatibility to the STD-GEN-CD profile.

### 14.1.1 File Meta Information for the Application Entity

The Source Application Entity Title is set by configuration.

### 14.1.2 Real-World Activities for this Application Entity

#### 14.1.2.1 Real-World Activity: Browse Directory Information

The DICOM Archive application acts as FSR using the interchange option when requested to read the media directory.

The DICOM archive application will read the DICOMDIR and insert that directory entries, which are supported, into a local database. The database can then be used for browsing media contents.

#### Note:

IconImageSQ is also supported in DICOMDIR. But only those IconImages with BitsAllocated (0028,0100) equal to 8 and size 64 by 64 or 128 by 128 pixels are imported into database and are visible in PatientBrowser.

### **14.1.2.1.1 Application Profiles for the RWA: Browse Directory Information**

See Table 74: for the Application Profiles listed that invoke this Application Entity for the Browse Directory Information RWA.

### **14.1.2.2 Real-World Activity: Import into local Storage**

The DICOM Archive application acts as FSR using the interchange option when requested to read SOP Instances from the medium into the local storage.

The SOP Instance selected from the media directory will be copied into the local storage. Only SOP Instances, that are supported, can be retrieved from media storage.

### **14.1.2.2.1 Application Profiles for the RWA: Import into local Storage**

See Table 74: for the Application Profiles listed that invoke this Application Entity for the Copy to Local Storage RWA.

### **14.1.2.3 Real-World Activity: Export to local Archive Media**

The DICOM Archive 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 DICOM Archive 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 SOP Instances are either updated or created on the media. Only valid SOP Instances are accepted.

The DICOM archive application will not close the CD-R medium.

### **14.1.2.3.1 Application Profiles for the RWA: Export to local Archive Media**

See Table 74: for the Application Profiles listed that invoke this Application Entity for the Copy to local Archive RWA.

#### **Note:**

If the image to be archived also has an IconImage in the database then there will be a Icon-ImageSQ be generated in DICOMDIR file for this image. The IconImageSQ will contain the following attributes:

- SamplesPerPixel (0028,0002) = 1
- Photometric Interpretation (0028,0004) = "MONOCHROME2"
- Rows (0028,0010), Columns (0028,0011)
  - = 128,128 for XA IOD images
  - = 64,64 for other images

- Bits Allocated (0028,0100) = 8
- Bits Stored (0028,0101) = 8
- High Bit (0028,0102) = 7
- Pixel Representation (0028,0103) = 0 (unsigned int)
- Planar Configuration (0028, 0006) is not set
- Pixel Aspect Ration (0028,0034) is not set (aspect ratio is 1/1)

## 14.1.3 Application profiles

### 14.1.3.1 DICOMDIR keys

The DICOMDIR file will contain the following attributes for the levels Patient - Study - Series - Image/Curve (valid for all Application profiles described in this section) :

*Table 75: DICOMDIR keys*

Attribute Name	Tag	Type	Notes
<b>File-Set identification</b>			
File-set ID	(0004,1130)	2	volume label of media
<b>Directory information</b>			
Offset of the First Directory Record of the Root Directory Entry	(0004,1200)	1	
Offset of the Last Directory Record of the Root Directory Entity	(0004,1202)	1	
File-set Consistency Flag	(0004,1212)	1	0000H
Directory Record Sequence	(0004,1220)	2	
> Offset of the Next Directory Record	(0004,1400)	1C	
> Record In-use flag	(0004,1410)	1C	FFFFH
> Offset of Referenced Lower-Level Directory Entity	(0004,1420)	1C	
> Directory Record Type	(0004,1430)	1C	PATIENT, STUDY, SERIES, IMAGE, CURVE, PRIVATE (see section 15.2.1)
> Referenced File ID	(0004,1500)	1C	contains the filename on media for the Directory Records of Type IMAGE and PRIVATE
> Referenced SOP Class UID in File	(0004,1510)	1C	for the Directory Records of Type IMAGE and PRIVATE

Table 75: DICOMDIR keys

Attribute Name	Tag	Type	Notes
> Referenced SOP Instance UID in File	(0004,1511)	1C	for the Directory Records of Type IMAGE and PRIVATE
> Referenced Transfer Syntax UID in File	(0004,1512)	1C	for the Directory Records of Type IMAGE and PRIVATE
> Record Selection Keys	see below		
<b>Patient Keys</b>			<b>Directory Record Type PATIENT</b>
Specific Character Set	(0008,0005)	1C	
Patient's Name	(0010,0010)	2	
Patient ID	(0010,0020)	1	
Date Of Birth	(0010,0030)	3	Type 2 in STD-XA* profiles
Patient's Sex	(0010,0040)	3	Type 2 in STD-XA* profiles
<b>Study Keys</b>			<b>Directory Record Type STUDY</b>
Specific Character Set	(0008,0005)	1C	
Study Date	(0008,0020)	1	
Study Time	(0008,0030)	1	
Accession Number	(0008,0050)	2	
Study Description	(0008,1030)	2	
Study Instance UID	(0020,000D)	1C	
Study ID	(0020,0010)	1	Will be generated automatically, if not present. Value = "-"
<b>Series Keys</b>			<b>Directory Record Type SERIES</b>
Specific Character Set	(0008,0005)	1C	
Series Date	(0008,0021)	3	
Series Time	(0008,0031)	3	
Modality	(0008,0060)	1	
Institution name	(0008,0080)	3	Type 2 in STD-XA* profiles
Institution Address	(0008,0081)	3	Type 2 in STD-XA* profiles
Series Description	(0008,103E)	3	
Performing Physician	(0008,1050)	3	Type 2 in STD-XA* profiles
Series Instance UID	(0020,000E)	1	
Series Number	(0020,0011)	1	
<b>Image Keys</b>			<b>Directory Record Type IMAGE</b>

Table 75: DICOMDIR keys

Attribute Name	Tag	Type	Notes
Specific Character Set	(0008,0005)	1C	
Image Type	(0008,0008)	3	identification characteristics Type 1 in STD-XA* profiles
SOP Class UID	(0008,0016)	3	
SOP Instance UID	(0008,0018)	3	
Image Date	(0008,0023)	3	
Image Time	(0008,0033)	3	
Referenced Image Sequence	(0008,1140)	3	Type 1C in STD-CTMR profile, required if present in image
> Referenced SOP Class UID	(0008,1150)		
> Referenced SOP Instance UID	(0008,1155)		
Image Number	(0020,0013)	1	
Image Position (Patient)	(0020,0032)	3	Type 1C in STD-CTMR profile, required if present in image
Image Orientation (Patient)	(0020,0037)	3	Type 1C in STD-CTMR profile, required if present in image
Frame Of Reference UID	(0020,0052)	3	Type 1C in STD-CTMR profile, required if present in image
Rows	(0028,0010)	3	
Columns	(0028,0011)	3	
Pixel Spacing	(0028,0030)	3	Type 1C in STD-CTMR profile, required if present in image
Calibration Image	(0050,0004)	3	Type 2 in STD-XA* profiles, for XA IOD
Icon Image Sequence	(0088,0200)	3	required for XA Application profiles, optional for the others
> Samples per Pixel	(0028,0002)		1
> Photometric Interpretation	(0028,0004)		MONOCHROME2
> Rows	(0028,0010)		128 for XA IOD, 64 otherwise Type 1 in STD-CTMR profile
> Columns	(0028,0011)		128 for XA IOD, 64 otherwise Type 1 in STD-CTMR profile
> Bits Allocated	(0028,0100)		8
> Bits Stored	(0028,0101)		8
> High Bit	(0028,0102)		7
> Pixel Representation	(0028,0103)		0 (unsigned)
> Pixel Data	(7FE0,0010)		Icon Image pixel data

Table 75: DICOMDIR keys

Attribute Name	Tag	Type	Notes
<b>Waveform Keys</b>			<b>Directory Record Type CURVE</b>
Specific Character Set	(0008,0005)	1C	
Curve Number	(0020,0024)	1	

see also section 15.2.1 on page 158 for the DICOMDIR attributes set for CsaNonImage IOD.

### 14.1.3.2 STD-GEN-CD

For media conforming to the STD-GEN-CD Profile the following SOP classes will be supported as a FSR, FSC and FSU.

Table 76: STD-GEN-CD Supported SOP Classes

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
CR Image	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
CT Image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
US-MF image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
US Image	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
SC Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
XA Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
XA-BiPlane Image	1.2.840.10008.5.1.4.1.1.12.3	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
XRF-Image	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
NM Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
PET Image	1.2.840.10008.5.1.4.1.1.128	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Digital X-Ray 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	yes	yes	yes
Digital X-Ray 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	yes	yes	yes

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
Digital Mammography X-Ray 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	yes	yes	yes
Digital Mammography X-Ray 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	yes	yes	yes
RT Structure Set	1.2.840.10008.5.1.4.1.1.481.3	Explicit VR Little Endian 1.2.840.10008.1.2.1	yes	yes	yes

Standalone IODs (Standalone Overlay, Standalone Curve, ..) are not supported by either FSR/FSC/FSU.

Detached Patient Management is not supported for import and therefore no precedence of values from those Instances can be supported.

### 14.1.3.3 STD-CTMR-xxxx

For media conforming to the STD-CTMR-MOD650, STD-CTMR-MOD12, STD-CTMR-MOD23, STD-CTMR-CD Profiles the following SOP classes will be supported as a FSR, FSC and FSU. JPEG compression is only provided as a FSR.

*Table 77: STD-CTMR-xxxx Supported SOP Classes*

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
CT Image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
CT Image	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	yes	yes	yes
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
MR Image	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	yes	yes	yes
SC Image (grayscale)	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
SC Image (grayscale)	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	yes	yes	yes
SC Image (palette color)	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes

Detached Patient Management is not supported for import and therefore no precedence of values from those Instances can be supported.

#### 14.1.3.4 STD-XABC-CD

For media conforming to the STD-XABC-CD Profile the following SOP classes will be supported as a FSR.

*Table 78: STD-XABC-CD Supported SOP Classes*

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
XA 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	yes	yes	yes

Detached Patient Management is not supported for import and therefore no precedence of values from those Instances can be supported.

#### 14.1.3.5 STD-XA1K-CD

For media conforming to the STD-XABC-CD Profile the following SOP classes will be supported as a FSR, FSC and FSU. JPEG compression is only provided as a FSR.

*Table 79: STD-XA1K-CD Supported SOP Classes*

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
XA 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	yes	yes	yes
SC Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes

Standalone IODs (Standalone Overlay, Standalone Curve, ..) are not supported by either FSR/FSC/FSU.

Detached Patient Management is not supported for import and therefore no precedence of values from those Instances can be supported.

### 14.1.3.6 STD-US-ID-SF-xxx

For media conforming to the STD-US-ID-SF-FLOP and STD-US-ID-SF-CDR Profiles the following SOP classes and transfer syntaxes will be supported as a FSR, FSC and FSU.

*Table 80: STD-US-ID-SF-xxx Supported SOP Classes*

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
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	yes	yes	yes
Ultrasound Multiframe Image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes

Only the following Photometric Interpretations are supported by FSR/FSC/FSU:

- MONOCHROME2
- PALETTE COLOR
- RGB

This restriction also applies for FSR.

### 14.1.3.7 STD-WVFM-GEN-FD

For media conforming to the STD-WVFM-GEN-FD Profile the following SOP classes will be supported as a FSR, FSC and FSU.

**Table 81:** STD-WVFM-GEN-FD Supported SOP Classes

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes

Detached Patient Management is not supported for import and therefore no precedence of values from those Instances can be supported.

# 15 Augmented and Private Profiles

## 15.1 Augmented Application Profiles

When configuring a compressed Transfer Syntax the STD-CTMR and STD-GEN application profile classes will be extended to store instances of the following SOP classes in compressed format:

*Table 82: Augmented Application profiles, Activities, and Roles for DICOM Archive*

Application Profiles Supported	Real World Activity	Role	SC Option
AUG-GEN-CD AUG-CTMR-CD	Browse Directory Information	FSR	Interchange
	Import into local Storage	FSR	Interchange
	Export to local archive media	FSC,FSU	Interchange

### 15.1.1 AUG-GEN-CD, AUG-CTMR-xxxx

For media conforming to the AUG-GEN-CD and AUG-CTMR-CD Profile the following SOP classes will be supported as a FSR, FSC and FSU. JPEG compression is only provided as a FSR.

*Table 83: AUG-GEN-CD, AUG-CTMR-xxxx Supported SOP Classes*

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
CR Image	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
CR Image	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	no	yes	no
CR Image	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	yes	yes	yes
CR Image	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	yes	yes	yes

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
CT Image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
CT Image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	no	yes	no
CT Image	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	yes	yes	yes
CT Image	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	yes	yes	yes
US-MF image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
US-MF image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	no	yes	no
US-MF image	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	yes	yes	yes
US-MF image	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	yes	yes	yes
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	no	yes	no
MR Image	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	yes	yes	yes

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
MR Image	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	yes	yes	yes
US Image	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
US Image	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	no	yes	no
US Image	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	yes	yes	yes
US Image	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	yes	yes	yes
SC Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
SC Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	no	yes	no
SC Image	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	yes	yes	yes
SC Image	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	yes	yes	yes
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
XA Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
XA Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	no	yes	no
XA 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	yes	yes	yes
XA Image	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	yes	yes	yes
XA-BiPlane Image	1.2.840.10008.5.1.4.1.1.12.3	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
XA-BiPlane Image	1.2.840.10008.5.1.4.1.1.12.3	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	no	yes	no
XA-BiPlane Image	1.2.840.10008.5.1.4.1.1.12.3	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	yes	yes	yes

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
XA-BiPlane Image	1.2.840.10008.5.1.4.1.1.12.3	JPEG lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	yes	yes	yes
XRF-Image	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
XRF-Image	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	no	yes	no
XRF-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	yes	yes	yes
XRF-Image	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	yes	yes	yes
NM Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
NM Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	no	yes	no
NM Image	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	yes	yes	yes
NM Image	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	yes	yes	yes
PET Image	1.2.840.10008.5.1.4.1.1.128	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes
PET Image	1.2.840.10008.5.1.4.1.1.128	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	no	yes	no

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Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
PET Image	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	yes	yes	yes
PET Image	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	yes	yes	yes
Digital X-Ray Image - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Big Endian 1.2.840.10008.1.2.2 Explicit VR Little Endian 1.2.840.10008.1.2.1 JPEG Baseline 1.2.840.10008.1.2.4.50 JPEG Extended (2 & 4) 1.2.840.10008.1.2.4.51 JPEG Lossless Non-hierarchical 1.2.840.10008.1.2.4.70	yes	yes	yes
Digital X-Ray Image - For Presentation	1.2.840.10008.5.1.4.1.1.1.1.1	Explicit VR Big Endian 1.2.840.10008.1.2.2 Explicit VR Little Endian 1.2.840.10008.1.2.1 JPEG Baseline 1.2.840.10008.1.2.4.50 JPEG Extended (2 & 4) 1.2.840.10008.1.2.4.51 JPEG Lossless Non-hierarchical 1.2.840.10008.1.2.4.70	yes	yes	yes
Digital Mammography X-Ray Image - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Explicit VR Big Endian 1.2.840.10008.1.2.2 Explicit VR Little Endian 1.2.840.10008.1.2.1 JPEG Baseline 1.2.840.10008.1.2.4.50 JPEG Extended (2 & 4) 1.2.840.10008.1.2.4.51 JPEG Lossless Non-hierarchical 1.2.840.10008.1.2.4.70	yes	yes	yes

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
Digital Mammography X-Ray Image - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Big Endian 1.2.840.10008.1.2.2 Explicit VR Little Endian 1.2.840.10008.1.2.1 JPEG Baseline 1.2.840.10008.1.2.4.50 JPEG Extended (2 & 4) 1.2.840.10008.1.2.4.51 JPEG Lossless Non-hierarchical 1.2.840.10008.1.2.4.70	yes	yes	yes
RT Structure Set	1.2.840.10008.5.1.4.1.1.481.3	Explicit VR Big Endian 1.2.840.10008.1.2.2 Explicit VR Little Endian 1.2.840.10008.1.2.1	yes	yes	yes

## 15.2 Private Application Profiles

The following Private Application Profiles supported to store private objects in addition to the Standard SOP classes allowed for the corresponding Standard Application Profile

**Table 84:** Private Application profiles, Activities, and Roles for DICOM Archive

Application Profiles Supported	Real World Activity	Role	SC Option
PRI-GEN-CD PRI-CTMR-CD	Browse Directory Information	FSR	Interchange
	Import into local Storage	FSR	Interchange
	Export to local archive media	FSC,FSU	Interchange

### 15.2.1 PRI-GEN-CD, PRI-CTMR-xxxx

For media conforming to the PRI-GEN-CD or PRI-CTMR-MOD650, PRI-CTMR-MOD12, PRI-CTMR-MOD23, PRI-CTMR-CD Profile the following SOP classes will be supported as a FSR, FSC and FSU in addition to the Standard SOP classes allowed for the corresponding Standard Application Profiles.

**Table 85:** PRI-GEN-CD, PRI-CTMR-xxxx Supported SOP Classes

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
CsaNonImage	1.3.12.2.1107.5.9.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	yes	yes	yes

The DICOMDIR file will contain the Directory record as described in section 14.1.3 on page 142 but with the following Private Keys instead of the Image Keys:

**Table 86:** DICOMDIR keys for CsaNonImage

Attribute Name	Tag	Private Creator	Type	Notes
Directory Record Type	(0004,1430)	-	1	PRIVATE
Private Record UID	(0004,1432)	-	1	1.3.12.2.1107.5.9.1
<b>Private keys</b>				
SOP Class UID	(0008,0016)	-	3	1.3.12.2.1107.5.9.1
SOP Instance UID	(0008,0018)	-	3	

*Table 86: DICOMDIR keys for CsaNonImage*

<b>Attribute Name</b>	<b>Tag</b>	<b>Private Creator</b>	<b>Type</b>	<b>Notes</b>
Image Type	(0008,0008)	-	3	identification characteristics
Acquisition Date	(0008,0022)	-	3	The date the acquisition of data that resulted in this data set started.
Acquisition Time	(0008,0032)	-	3	The time the acquisition of data that resulted in this data set started.
Acquisition Number	(0020,0012)	-	3	A number identifying the single continuous gathering of data over a period of time which resulted in this data set.
CSA Data Type	(0029,xx08)	SIEMENS CSA NON-IMAGE	1	CSA Data identification characteristics.
CSA Data Version	(0029,xx09)	SIEMENS CSA NON-IMAGE	3	Version of CSA Non-Image Data

No IconImageSQ will be stored for CsaNonImage objects.

# 16 Extensions, Specializations and Privatizations of SOP Classes and Transfer Syntaxes

not applicable.

# 17 Configuration

## 17.1 AE Title Mapping

### 17.1.1 DICOM Media Storage AE Title

The DICOM Storage application (Image Manager) provides the application entity title:

CsaImageManager

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# 18 Support of Extended Character Sets

The Siemens DICOM media application supports the ISO 8859 Latin 1 (ISO-IR 100) character set family and the same family with code extensions (ISO 2022 IR 100 Latin-1). For international versions the following character sets are supported:

- ISO\_IR 13 Japanese (Katakana+Romaji) (JIS X 0201)
- ISO 2022 IR 13 Japanese (Katakana+Romaji)
- ISO 2022 IR 87 Kanji (JIS X 0208)
- ISO 2022 IR 159 Supplementary Kanji (JIS X 0212).

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