SIEMENS

SIENET Cosmos
VA15A

HS

DICOM Conformance Statement

Rev. 4.0

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Siemens AG Medical Solutions, Health Services
Henkestr. 127, D-91052 Erlangen

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A) Network Conformance Statement

This part contains the Conformance declaration for the DICOM Network Services:

- Storage - SCU/SCP
- Storage Commitment SCP
- MPPS - SCU/SCP
- Query/Retrieve - SCP/SCU
- Verification - SCP
- Print SCU

These services are implemented according the DICOM standard and according IHE Year5 [2] Rules. Following actors and Intergration Profiles are supported as declared in [3]:

- Image Manager / Image Archive (SWF,PIR,RWF,CPI,KIN,ED,ARI)
- Performed Procedure Step Manager (SWF,PIR,RWF)
- Report Repository (SINR,ARI)

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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 SIENET Cosmos based products. The SIENET Cosmos DICOM network implementation acts as SCU and SCP for the DICOM Storage, Query/Retrieve and MPPS services and as SCP for Storage Commitment. The SIENET Integrated Workplace acts as a Query SCU and as a Print SCU.

1.2 Scope

This DICOM Conformance Statement refers to Siemens SIENET Cosmos based products. The following table relates SIENET Cosmos software names to Siemens products.

Table 1: *DICOM Products*

Product	Software Name	Short Name
SIENET Cosmos	Image Data Management	IDM
SIENET Cosmos	Integrated Workplace	IWP
SIENET Cosmos	Image Workflow Manager	IWM
Novius	Novius Radiology	

This document describes the conformance of the following products

- SIENET Cosmos Image Data Management
  The relavant sections are chapter 2, 3, 6, 7, 8 and 9.
- SIENET Cosmos Integrated Workplace
  The relevant sections are chapter 4, 5, 7, 8, 9 and section "B) Media Storage Conformance Statement"

Please note, that the DICOM Conformance of the following products is described in separate documents:

- SIENET Cosmos Image Workflow Manager [4]
- Novius Radiology [5]

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1.3 Definitions, Acronyms and 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 Acronyms and Abbreviations

ACR	American College of Radiology
AE	DICOM Application Entity
ASCII	American Standard Code for Information Interchange
DB	Database
DCS	DICOM Conformance Statement
IOD	DICOM Information Object Definition
ISO	International Standard Organization
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, 2003

1.5 Connectivity and Interoperabilty

This Conformance Statement by itself does not guarantee successful interoperabilty of Siemens equipment with non-Siemens equipment. The user (user's agent) should be aware of the following issues:

- Interoperabilty

  Interoperabilty refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into a networked environment may require application functions that are not specified within the scope of DICOM. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperabilty of Siemens equipment with non-Siemens equipment. It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates Siemens equipment with non-Siemens equipment.

- Validation

  Siemens equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement.
  Where Siemens equipment is linked to non-Siemens equipment, the first step is to compare the relevant Conformance Statements. If the Conformance Statements indicate that successful information exchange should be possible, additional validation test will be necessary to ensure the functionality, performance, accuracy and stability of image and image related data. It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

- New versions of the DICOM Standard

  the DICOM Standard will evolve in future to meet the user's growing requirements and to incorporate new features and technologies. Siemens is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard. In order to do so, Siemens reserves the right to make changes to its products or to discontinue their delivery. The user should ensure that any non-Siemens provider linking to Siemens equipment, also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into Siemens equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

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2 Implementation Model IDM

The SIENET Image Data Management supports one DICOM Application Entity (AE). This AE receives associations for

- Verification,
- Storage,
- Storage Commitment,
- Query/Retrieve and
- Modality Performed Procedure Steps (MPPS).

The same AE requests associations to remote AEs for

- Storage,
- MPPS, and
- Storage Commitment

Although SIENET Image Data Management currently has only one AE, each functionality is described in a separate subchapter.

2.1 Implementation Model Storage

The SIENET Image Data Management DICOM Application Entity both originates associations for Storage of DICOM Composite Information Objects in Remote Application Entities and receives association requests for Storage from Remote Application Entities.

2.1.1 Application Data Flow Diagram

The SIENET Image Data Management DICOM network implementation acts as SCU and SCP for the C-STORE DICOM network service and as SCP for the C-ECHO DICOM network service.

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

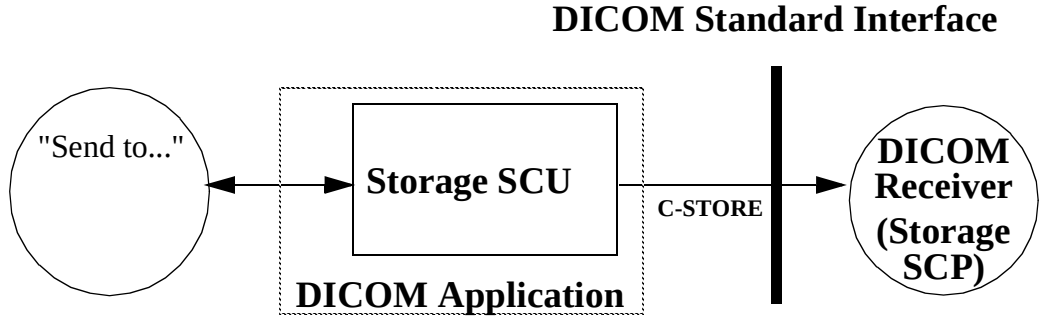
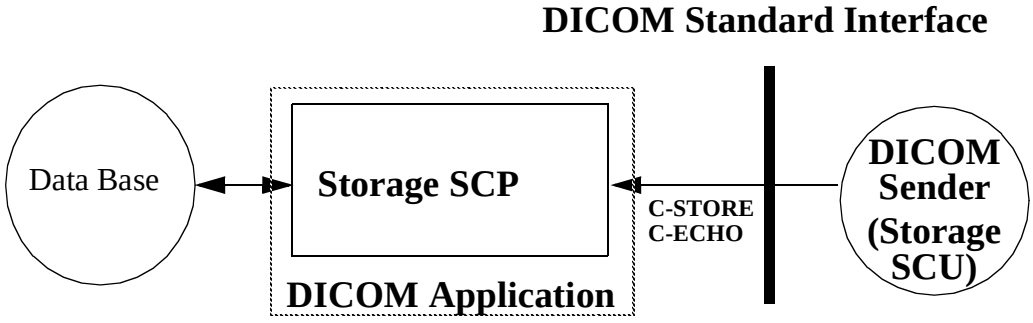


Figure 2: *Application Data Flow Diagram - Storage SCP*



2.1.2 Functional Definitions of Application Entities

The Storage SCU is invoked either internally by the Query/Retrieve Application Entity that is responsible for processing retrieve requests or by a trigger of the internal communication system. The request consists of data describing the composite image objects selected for storage and the destination. An association is negotiated with the destination application entity and the image data is transferred using the C-STORE DIMSE-Service. The transfer status is reported to the Query/Retrieve User.

The Storage SCP component of the SIENET Image Data Management DICOM application is operating as background server process. It is existing as soon as the system is powered up and waits for Storage association requests. Upon accepting an association with a negotiated Presentation Context it starts to receive the Composite Image Objects and imports them to the database. Verification requests will be processed and responded to the Storage SCP component, too.

2.1.3 Sequencing of real World Activities

not applicable.

2.2 Implementation Model MPPS

The modality performed procedure step service class defines an application-level class of services which facilitates the transfer of procedure information from the imaging modality to the information system, in this case to the PACS system.

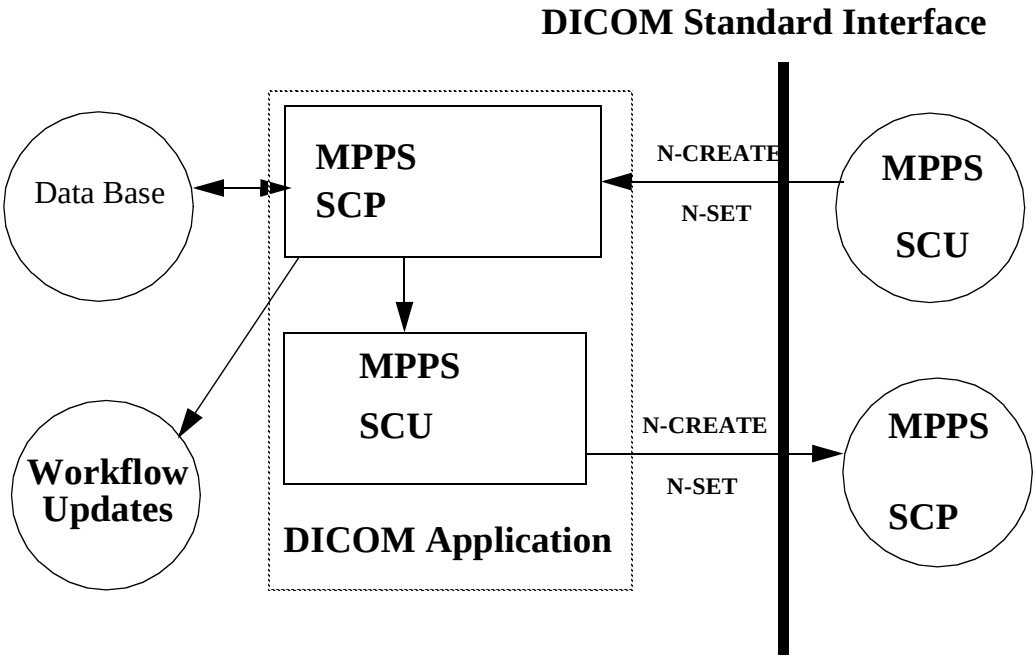
The SIENET Image Data Management DICOM application supports the modality performed procedure step services as SCP.

Additionally the MPPS information can be forwarded to another system. In this case the SIENET Image Data Management DICOM application supports the modality performed procedure step services as SCU.

2.2.1 Application Data Flow Diagram

The SIENET Image Data Management DICOM network implementation acts as SCP and SCU for the MPPS network service.

Figure 3: *Application Data Flow Diagram - Modality Performed Procedure Step SCP*



2.2.2 Functional Definitions of Application Entities

The SIENET Image Data Management DICOM MPPS SCP stores the MPPS instance and performs updates corresponding to the SCU requests. The state of the MPPS is used to update scheduled procedure information, and to schedule further procedures like post-processing tasks.

All components of the modality performed procedure step SCP application are operating as background server processes. They are existing as soon as the system is powered up and then respond to creation and updates of MPPS objects and stores parts of this information in its database.

2.2.3 Sequencing of Real World Activities

not applicable.

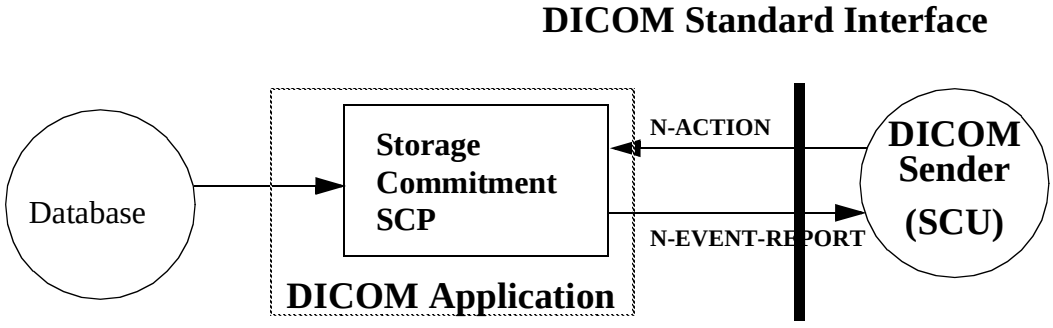
2.3 Implementation Model Storage Commit

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 composite objects in addition to the network based storage of images as defined by the Storage Service class. The SIENET Image Data Management DICOM implementation supports the Storage Commitment Push Model as SCP.

2.3.1 Application Data Flow Diagram

The SIENET Image Data Management DICOM network implementation acts as SCP for the Storage Commitment Push Model Service using the Storage Commitment Service Class.

Figure 4: *Application Data Flow Diagram Storage Commitment SCP*



2.3.2 Functional Definitions of Application Entities

Additional to each successfully completed send job, modalities should trigger a Storage Commit request for the safekeeping of the SOP Instances sent to the SIENET Image Data Management.The Storage Commitment SCP is running in the background and is ready to receive requests when the system is started.

The Storage Commitment SCP will try to send the response on the same association or, if that fails, on a new association.

2.3.3 Sequencing of real World Activities

The SCP requires that the images are stored before a Storage Commitment request is sent. The SCP will not queue Storage Commitment requests.

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2.4 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 SIENET Image Data Management DICOM query/retrieve application supports the query/retrieve service as SCP and retrieve as SCU.

2.4.1 Application Data Flow Diagram

The SIENET Image Data Management DICOM network implementation acts as SCP for the query/retrieve network service and as SCU for the retrieve network service.

Figure 5: *Application Data Flow Diagram - Query/Retrieve SCP*

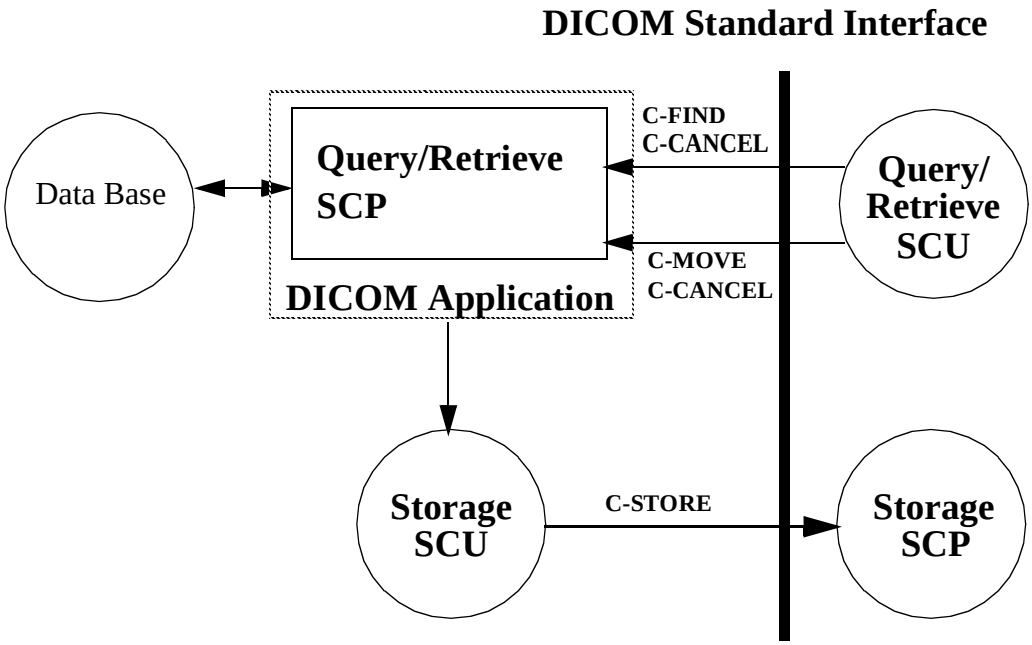
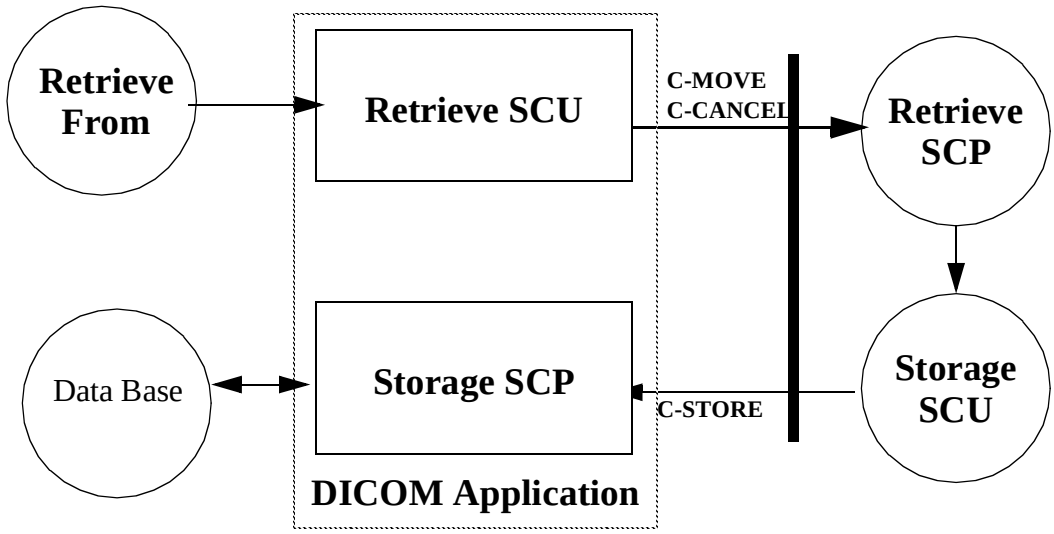


Figure 6: *Application Data Flow Diagram - Retrieve SCU*



2.4.2 Functional Definitions of Application Entities

The SIENET Image Data Management DICOM retrieve SCU initiates a C-MOVE DIMSE request on the remote retrieve SCP. The remote retrieve SCP in turn starts C-STORE suboperations on the SIENET Cosmos Storage SCP. The SIENET Image Data Management DICOM retrieve SCU is triggered and parameterized by an internal protocol. The SIENET Image Data Management is no Query SCU.

The SIENET Image Data Management DICOM query/retrieve SCP responds to C-FIND DIMSE services from a remote SCU and depending on further remote request C-MOVE involves the Siemens SIENET Image Data Management DICOM query/retrieve SCP application to initiate a C-STORE sub-operation (by triggering and parametrizing the own Storage SCU) to send image objects to a remote Storage SCP.

All components of the query/retrieve SCP application are operating as background server processes. They are existing when the machine is powered on and then respond to queries based on the records stored in its database.

In a multiserver environment, different Storage SCU located on different servers might be excecuting one C-MOVE request.

2.4.3 Sequencing of Real World Activities

not applicable.

3 AE Specification IDM

3.1 IDM - Specification

The SIENET Image Data Management SCU/SCP applications use one single AET when initiating/receiving associations to/from remote DICOM nodes.

SIENET Image Data Management AE provides Standard Conformance to the DICOM V3.0 SOP Classes as an SCP:

- all Storage SOP Classes defined in Table 2:
- all MPPS SOP Classes defined in Table 4:
- all Storage Commitment SOP Classes defined in Table 5:
- all Query/Retrieve SOP Classes defined in Table 3:

The SIENET Image Data Management AE provides Standard Conformance to the DICOM V3.0 SOP Classes as an SCU:

- all Storage SOP Classes defined in Table 2:
- all MPPS SOP Classes defined in Table 4:
- all Query/Retrieve SOP Classes defined in Table 6:

Table 2: *Storage SOP Classes (SCU and SCP)*

SOP Class Name	SOP Class UID
CR Computed Radiography Object Storage	1.2.840.10008.5.1.4.1.1.1
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
US Multi-frame Object Storage	1.2.840.10008.5.1.4.1.1.3.1
US Multi-frame Object Storage (Retired)	1.2.840.10008.5.1.4.1.1.3
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1
US Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6
SC Image Storage	1.2.840.10008.5.1.4.1.1.7
Stand-Alone Overlay Storage	1.2.840.10008.5.1.4.1.1.8
Stand-Alone Curve Storage	1.2.840.10008.5.1.4.1.1.9
Stand-Alone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10
Stand-Alone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1

Table 2: *Storage SOP Classes (SCU and SCP)*

SOP Class Name	SOP Class UID
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2
X-Ray Angiographic Bi-Plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3
NM Image Storage	1.2.840.10008.5.1.4.1.1.20
NM Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5
Stored Print Storage	1.2.840.10008.5.1.4.1.1.27
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.4.1.1.29
Hardcopy Color Image Storage	1.2.840.10008.5.1.4.1.1.30
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Stand-Alone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50
Key Object Selection	1.2.840.10008.5.1.4.1.1.88.59
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65
Digital X-Ray Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.1

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Table 2: *Storage SOP Classes (SCU and SCP)*

SOP Class Name	SOP Class UID
Digital X-Ray Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.1.1
Digital Mammography X-Ray Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.2
Digital Mammography X-Ray Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.2.1
Digital Intra-oral X-Ray Image Storage Presentation	1.2.840.10008.5.1.4.1.1.1.3
Digital Intra-oral X-Ray Image Storage Processing	1.2.840.10008.5.1.4.1.1.1.3.1
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1
CSA Non- Image Storage	1.3.12.2.1107.5.9.1

Table 3: *Query/Retrieve SOP Classes as an 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
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
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1

Table 3: *Query/Retrieve SOP Classes as an SCP*

SOP Class Name	SOP Class UID
Patient/Study Only Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2

Table 4: *MPPS SOP Classes as an SCP/SCU*

SOP Class Name	SOP Class UID
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3

Table 5: *Storage Commitment SOP Class as an SCP*

SOP Class Name	SOP Class UID
Storage Commitment Push Model	1.2.840.10008.1.20.1

Table 6: *Query/Retrieve SOP Classes as an SCU*

SOP Class Name	SOP Class UID
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Study Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2
Patient/Study Only Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2

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3.1.1 Association Establishment Policies

3.1.1.1 General

The default PDU size used will be 28 KB.

3.1.1.2 Number of Associations

The SIENET Image Data Management AE accepts multiple associations at a time. The maximum number is configurable. If the number is reached, a newly required association will be rejected with reason=local-limit-exceeded until some associations are released. This transient rejection response might be delayed to avoid immediate retries.

The Storage SCU initiates a new association for each request (i.e. from a DICOM C_MOVE or an internal "SentTo") regardles of the number of already open associations.

The MPPS SCU initiates one association to the forwarding destination.

The Storage Commitment SCP initiates a new association to the SCU if the original association (over which the request has been sent) is already closed.

The Query/Retrieve SCU initiates a new association for each internal "RetrieveFrom" request.

3.1.1.3 Asynchronous Nature

The SIENET Image Data Management DICOM software does not support asynchronous communication (multiple outstanding transactions over a single association).

3.1.1.4 Implementation Identifying Information

The SIENET Image Data Management DICOM software provides a single Implementation Class UID of

- 1.3.12.2.1107.5.8.7

and an Implementation Version Name of

- SDM

3.1.2 Association Initiation Policy

SIENET Image Data Management initiates associations while processing the service operations and internal messages as shown in the following table:

operation	inititate association for
DIMSE C-MOVE (as SCP)	C-STORE
DIMSE N-ACTION (Storage Commitment)	N-EVENT-REPORT
DIMSE N-CREATE, DIMSE N-SET (MPPS)	N-CREATE, N-SET
SendTo	C-STORE
RetrieveFrom	C-MOVE

3.1.2.1 Real-World Activity "Send Objects to a Network destination"

3.1.2.1.1 Associated Real-World Activity

The associated Real-World activity is a trigger to send objects to another DICOM AE. This activity is triggered either by a C-MOVE request initiated by an external DICOM AE or an internal "SendTo" message.

If the process successfully establishes an association to a remote Application Entity, it will transfer each image one after another via the open association. No retry mechanisms are implemented.

3.1.2.1.2 Proposed Presentation Contexts

The SIENET Image Data Management DICOM application will propose Presentation Contexts as shown in the following table *(cf. to Table 7)*. Only needed contexts (SOP classes to be sent) will be negotiated

Table 7: *Initiation Presentation Context - Storage*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None

Table 7: *Initiation Presentation Context - Storage*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Digital X-Ray Image Storage for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
Digital X-Ray Image Storage for Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
Digital Mammography X-Ray Image Storage for Presentation	1.2.840.10008.5.1.4.1.1.1.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Lossless JPEG 2000 Lossless Only JPEG 2000 RLE Lossless	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91 1.2.840.10008.1.2.5	SCU	None
US Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Lossless JPEG 2000 Lossless Only JPEG 2000 RLE Lossless	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91 1.2.840.10008.1.2.5	SCU	None

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Table 7: *Initiation Presentation Context - Storage*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Lossless JPEG 2000 Lossless Only JPEG 2000 RLE Lossless	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91 1.2.840.10008.1.2.5	SCU	None
US Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Lossless JPEG 2000 Lossless Only JPEG 2000 RLE Lossless	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91 1.2.840.10008.1.2.5	SCU	None
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None

Table 7: *Initiation Presentation Context - Storage*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
X-Ray Angiographic Bi-Plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None

Table 7: *Initiation Presentation Context - Storage*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Nuclear Medicine Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
Stored Print Storage	1.2.840.10008.5.1.4.1.1.27	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.4.1.1.29	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
Hardcopy Color Image Storage	1.2.840.10008.5.1.4.1.1.30	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None

Table 7: *Initiation Presentation Context - Storage*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
Digital Mammography X-Ray Image Storage for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
Digital Intraoral X-Ray Image Storage for Presentation	1.2.840.10008.5.1.4.1.1.1.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None

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Table 7: *Initiation Presentation Context - Storage*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Digital Intra-oral X-Ray Image Storage for Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCU	None
Stand-alone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Stand-alone Curve Storage	1.2.840.10008.5.1.4.1.1.9	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Stand-alone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Stand-alone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Key Object Selection	1.2.840.10008.5.1.4.1.1.88.59	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None

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Table 7: *Initiation Presentation Context - Storage*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Stand-alone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None

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Table 7: *Initiation Presentation Context - Storage*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
CSA NON Image	1.3.12.2.1107.5.9.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None

3.1.2.1.3 SOP Specific Conformance to Storage SOP Classes

The SIENET Image Data Management will not change private attributes as long as no modification is done

3.1.2.1.4 Specialized Information Object Definitions

The DICOM images created by SIENET Image Data Management DICOM application conform to the DICOM IOD definitions (Standard extended IODs). But they will contain additional private elements.

The DICOM nodes are responsible for data consistency when modifying images with private attributes.

3.1.2.2 Real World Activity "Forward MPPS message"

3.1.2.2.1 Associated Real-World Activity

The associated Real-World activity is receiving a MPPS message from a modality. IHE [2] requires that the MPPS provider is able to forward this message to another system.

3.1.2.2.2 Proposed Presentation Contexts

The SIENET Image Data Management application will propose Presentation Contexts as shown in the following table

Table 8: *Proposed Presentation Contexts - send MPPS*

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

3.1.2.2.3 SOP Specific Conformance - MPPS

All attributes received by SIENET Image Data Management will be sent without any changes, interpretation or validation. Therefore no list of supported attribtues is given.

<Italic_12>please refer to 3.1.3.2 (pg. 49)

If the destination is not reachable, the SIENET Image Data Management will neither try sending the message again a second time, nor is the status returned from the destination evaluated.

The message will always be forwarded, even if the SIENET Image Data Management application returns an error to the SCU.

3.1.2.3 Real World Activity "Send Commitment Response"

3.1.2.3.1 Associated Real-World Activity

In the following case the SIENET Image Data Management AE will itself initiate an association to send the storage commitment response (N_EVENT_REPORT) to the SCU.

- The AE receives a Storage Commitment request, carries out the request, and is ready to send back the response, but the association is not open anymore. In this case it will by itself initiate an association to send the storage commitment response (N_EVENT_REPORT) to the SCU.

3.1.2.3.2 Proposed Presentation Contexts - Send Commitment Response

The SIENET Image Data Management DICOM application will propose Presentation Contexts as shown in the following table:

Table 9: *Proposed Presentation Contexts - Send Storage Commitment Response*

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

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3.1.2.4 Real World Activity "RetrieveFrom"

3.1.2.4.1 Associated Real-World Activity

The associated "Real World Activity" is to receive a "RetrieveFrom" request on the internal communication framework of the SIENET Image Data Management. The DICOM application will then open a new, dedicated association, issue a C-MOVE request with the query parameters of the RetrieveFrom call. "Pending Responses" are propagated back to the initiator. After the C-MOVE request has been completed, the association is closed.

3.1.2.4.2 Proposed Presentation Contexts - Move SCU

The SIENET Image Data Management DICOM application will propose Presentation Contexts as shown in the following table. Only needed contexts will be negotiated.

Table 10: *Initiation Presentation Context - Retrieve*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Patient Root Query/Retrieve Move	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Study Root Query/Retrieve Move	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Patient/Study Only Query/Retrieve Move	1.2.840.10008.5.1.4.1.2.3.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

3.1.2.4.3 SOP Specific Conformance Statement - Move SCU

The MOVE SCU interprets the following status codes in a special way. If other codes are received they are considered to be failures of some kind. These failures are given back to the initiator of the "RetrieveFrom" function.

Table 11: *C-MOVE SCU status codes*

Service Status	**Meaning**	**Protocol Codes**	**Related Fields**
Success	Suboperations complete - No failures or Warning	0000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Canceled	Suboperations terminated due to Cancel Indication	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)

Table 11: *C-MOVE SCU status codes*

Service Status	Meaning	Protocol Codes	Related Fields
Warning	Suboperations Complete - One or more failures	B000	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Pending	Suboperations are continuing	FF00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)

3.1.3 Association Acceptance Policy

The SIENET Image Data Management application attempts to accept a new association for

- DIMSE C-ECHO
- DIMSE C-STORE
- DIMSE C-MOVE
- DIMSE C-FIND
- DIMSE C-CANCEL
- DIMSE N-CREATE/N-SET (MPPS)
- DIMSE N_ACTION (Storage Commitment)

service operations as an SCP.

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

- The IP address of the peer can be resolved into a hostname (aka. reverse lookup). (This check can be disabled.)
- The "called AET" matches the configured AET of the SIENET Image Data Management DICOM application. (This check can be disabled.)
- The maximum number of incoming associations is not reached *(cf. to section 3.1.1.2).*
- At least one Presentation Context has been proposed with at least one suitable transfersyntax as defined by the "Presentation Context Tables" in the following subsections.

Generally all presentation contexts are accepted as long as it contains at least one suitable transfer syntax. All other presentation contexts are rejected.

If a Proposed Presentation Context contains more than one Transfer Syntaxes, the first one in the following list is chosen (if applicable for the SOP class):

- Explicit VR Little Endian
- Implicit VR Little Endian
- Explicit VR Big Endian
- JPEG Lossless (Process 14)

- JPEG 2000 Lossless Only
- RLE
- JPEG Baseline

3.1.3.1 Real-World Activity "Receive Objects from Remote Node"

3.1.3.1.1 Associated Real-World Activity

The SIENET Image Data Management receiving process will accept an association, receive any images transmitted on that association and store the images on disk. It will store some header attributes in the database in order to allow clients to query these attributes and in order to trigger workflow related actions.

3.1.3.1.2 Presentation Context Table

The Siemens SIENET Image Data Management DICOM application will accept Presentation Contexts as shown in the following table *(cf. to Table 12)*:

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Table 12: *Acceptable Presentation Contexts - Storage*

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
Digital X-Ray Image Storage for Presentation	1.2.840.10008.5.1.4.1.1.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
Digital X-Ray Image Storage for Processing	1.2.840.10008.5.1.4.1.1.1.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
Digital Mammography X-Ray Image Storage for Presentation	1.2.840.10008.5.1.4.1.1.1.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
Digital Mammography X-Ray Image Storage for Processing	1.2.840.10008.5.1.4.1.1.1.2.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None

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Table 12: *Acceptable Presentation Contexts - Storage*

Digital Intra-oral X-Ray Image Storage for Presentation	1.2.840.10008.5.1.4.1.1.1.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
Digital Intra-oral X-Ray Image Storage for Processing	1.2.840.10008.5.1.4.1.1.1.3.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Lossless JPEG 2000 Lossless Only JPEG 2000 RLE Lossless	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91 1.2.840.10008.1.2.5	SCP	None
US Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Lossless JPEG 2000 Lossless Only JPEG 2000 RLE Lossless	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91 1.2.840.10008.1.2.5	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Lossless JPEG 2000 Lossless Only JPEG 2000 RLE Lossless	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91 1.2.840.10008.1.2.5	SCP	None

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Table 12: *Acceptable Presentation Contexts - Storage*

US Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Lossless JPEG 2000 Lossless Only JPEG 2000 RLE Lossless	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91 1.2.840.10008.1.2.5	SCP	None
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
Multi-frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
Multi-frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None

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Table 12: *Acceptable Presentation Contexts - Storage*

X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
X-Ray Angiographic Bi-Plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
NM Image Storage	1.2.840.10008.5.1.4.1.1.20	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
NM Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
Stored Print Storage	1.2.840.10008.5.1.4.1.1.27	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
Hardcopy Grayscale Image Storage	1.2.840.10008.5.1.4.1.1.29	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None

Table 12: *Acceptable Presentation Contexts - Storage*

Hardcopy Color Image Storage	1.2.840.10008.5.1.4.1.1.30	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
VL Photographic Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Baseline JPEG Extended 24 JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian JPEG Lossless JPEG 2000 Lossless Only JPEG 2000	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.4.70 1.2.840.10008.1.2.4.90 1.2.840.10008.1.2.4.91	SCP	None

Table 12: *Acceptable Presentation Contexts - Storage*

Stand-alone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Stand-alone Curve Storage	1.2.840.10008.5.1.4.1.1.9	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Stand-alone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Stand-alone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Mammography CAD SR	1.2.840.10008.5.1.4.1.1.88.50	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None

Table 12: *Acceptable Presentation Contexts - Storage*

Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Key Object Selection	1.2.840.10008.5.1.4.1.1.88.59	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Stand-alone PET Curve Storage	1.2.840.10008.5.1.4.1.1.129	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
CSA Non-Image Storage	1.3.12.2.1107.5.9.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None
Verification	1.2.840.10008.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCP	None

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3.1.3.1.3 SOP Specific Conformance Statement

The SIENET Image Data Management DICOM application conforms to the Full Storage Class at Level 2. In case of a successful C-STORE operation, the image has successfully been written on disc either in Explicit Little Endian format or in the compression format received.

Note: Return Status "Success"

The SIENET Image Data Management DICOM receiver returns the status Success upon successful operation. Successful operation does **not** guarantee a successful storage of the metadata in the database. It does mean that the images are successfully stored on the filesystem and a minimal image header validation was successful. The received image header contains a syntactically valid and not empty Patient Name, Patient ID, Study Instance UID, Series Instance UID and SOP Instance UID.

Due to the IHE Patient Information and Reconciliation profile (PIR), patient and study information might be updated after successful storage.

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

Table 13: *C-STORE SCP Return Status*

Service Status	Meaning	Protocol Codes	Related Fields
Error	missing, empty or invalid atribute(s) Missing attribute is stored in (0000,0901)	A900	(0000,0901) (0000,0902)
Processing Failure	could not write to filesystem could not write to database could not translate metadata	0110	(0000,0902)
In the cases mentioned above the image is not stored, neither on filesystem nor in the database. The association will not be aborted.			
Success	image is successfully stored on file system	0000	None

Note Patient ID

The Patient ID is specified as a "type 2" attribute by DICOM. Therefore the attribute must be in the message but it may be empty. The SIENET Image Data Management needs the Patient ID for internal processing and therefore treats the attribute as "type 1".

The SIENET Cosmos shall assure consistent handling of all UIDs by all components of the SIENET Cosmos system

If the insertion of the image information to the database fails a message will be generated and a system administrator has the possibility to correct these images or whatever might be useful. It is strongly recommended that modalities use the Storage commitment service before deleting the images from their local databases.

It is possible to configure sending the status Success **after** inserting the metadata to the database. This however has an impact on performance.

Note: Multi-frame Single Bit Secondary Capture Image Storage

Currently this SOP class has the following restrictions: The image must contain only one frame or the each frame must end on exact byte boundaries. Otherwise the image is rejected.

3.1.3.2 Real World Activity "Receive MPPS messages"

3.1.3.2.1 Associated Real-World Activity

The associated Real-World activity is to accept a newly performed procedure from an SCU.

Multiple N-CREATE , N-SET requests over the same association are supported.

3.1.3.2.2 Accepted Presentation Contexts

The SIENET Image Data Management DICOM application will accept Presentation Contexts as shown in the following table:

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

3.1.3.2.3 SOP Specific Conformance Statement

The following tables describe the supported attributes, which are stored in the database. Although DICOM does not allow to set some attributes in the N-SET Request - like performed procedure step relationship attributes or modality and study id - the

SCP would change new values for these attributes, if they are present in the message.

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Table 14: *Performed Procedure Step N-CREATE Attributes*

Attribute name	Tag	Value
Performed Procedure Step Relationship		
Scheduled Step Attribute Sequence	(0040,0270)	
>Study Instance UID	(0020,000D)	
>Referenced Study Sequence	(0008,1110)	
>>Referenced SOP Class UID	(0008,1150)	
>>Referenced SOP Instance UID	(0008,1155)	
>Accession Number	(0008,0050)	
>Requested Procedure ID	(0040,0001)	
>Requested Procedure Description	(0032,1060)	
>Scheduled Procedure Step ID	(0040,0009)	
>Scheduled Procedure Step Description	(0040,0007)	
>Scheduled Action Item Sequence	(0040,0008)	
>>Code Value	(0008,0100)	
>>Coding Scheme Designator	(0008,0102)	
>>Coding Scheme Version	(0008,0103)	
>>Code Meaning	(0008,0104)	
Patient's Name	(0010,0010)	
Patient ID	(0010,0020)	
Patient's Birth Date	(0010,0030)	
Patient's Sex	(0010,0040)	
Performed Procedure Step Informations		
Performed Procedure Step ID	(0040,0253)	
Performed Station AE Title	(0040,02410	
Performed Station Name	(0040,0242)	
Performed Location	(0040,0243)	
Performed Procedure Step Start Date	(0040,0244)	
Performed Procedure Step Start Time	(0040,0245)	
Performed Procedure Step Status	(0040,0252)	"IN PROGRESS"
Performed Procedure Step Description	(0040,0254)	
Performed Procedure Type Description	(0040,0255)	
Procedure Code Sequence	(0008,1032)	
>Code Value	(0008,0100)	

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Attribute name	Tag	Value
>Coding Scheme Designator	(0008,0100)	
>Coding Scheme Version	(0008,0100)	
>Code Meaning	(0008,0100)	
Performed Procedure Step End Date	(0040,0250)	
Performed Procedure Step End Time	(0040,0251)	
Image Acquisition Results		
Modality	(0008,0060)	
Study ID	(0020,0010)	
Performed Action Item Code Sequence	(0040,0260)	
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0100)	
>Coding Scheme Version	(0008,0100)	
>Code Meaning	(0008,0100)	
Performed Series Sequence	(0040,0340)	
>Performing Physicians's Name	(0008,1050)	
>Operator's Name	(0008,1070)	
>Series Instance UID	(0020,000E)	
>Series Description	(0008,103E)	
>Retrieve AE Title	(0008,0054)	
>Referenced Image Sequence	(0008,1140)	
>Referenced Standalone SOP Instance Sequence	(0040,0220)	

The MPPS provider expects a complete set of attributes in the N-SET Request message. If an attribute is missing or filled with a different value, the old values will be overwritten.

Table 15: *Performed Procedure Step N-SET Attributes*

Attribute name	Tag	Value
Performed Procedure Step Informations		
Performed Procedure Step Status	(0040,0252)	"COMPLETED" or "DIS-CONTINUED"
Performed Procedure Step Description	(0040,0254)	
Performed Procedure Type Description	(0040,0255)	
Procedure Code Sequence	(0008,1032)	

Attribute name	Tag	Value
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0100)	
>Coding Scheme Version	(0008,0100)	
>Code Meaning	(0008,0100)	
Performed Procedure Step End Date	(0040,0250)	
Performed Procedure Step End Time	(0040,0251)	
Image Acquisition Results		
Performed Action Item Code Sequence	(0040,0260)	
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0100)	
>Coding Scheme Version	(0008,0100)	
>Code Meaning	(0008,0100)	
Performed Series Sequence	(0040,0340)	
>Performing Physicians's Name	(0008,1050)	
>Protocol Name	(0018,1030)	
>Operator's Name	(0008,1070)	
>Series Instance UID	(0020,000E)	
>Series Description	(0008,103E)	
>Retrieve AE Title	(0008,0054)	
>Referenced Image Sequence	(0008,1140)	
>>Referenced SOP Class UID	(0008,1150)	
>>Referenced SOP Instance UID	(0008,1155)	
>Referenced Standalone SOP Instance Sequence	(0040,0220)	

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3.1.3.2.4 Return Codes.

The SCP returns following status codes:

Table 16: *N-SET/N-CREATE Return Status*

Service Status	Status Code	Meaning	Related Fields
Processing failure	0110H	Application processing failure	(0000,0902)
Processing failure	0110H	MPPS already completed	(0000,0902)= Performed Procedure Step Object may no longer be updated (0000,0903) = 0xA710
Duplicate SOP instance	0111H	The optional field contains the SOP Instance UID which was already allocated to another SOP Instance	(0000,1000)
Missing attribute	0120H		Attribute List
Invalid attribute value	0106H		Attribute List
Missing attribute value	0121H		Attribute List
Success	0000H	Matching is complete - No final Identifier is supplied	None

3.1.3.3 Real World Activity "Receive Storage Commitment Request"

3.1.3.3.1 Associated Real-World Activity

When receiving a Storage Commitment request the SIENET Image Data Management DICOM application will perform the necessary steps to check the received list of instances against the database.

3.1.3.3.2 Accepted Presentation Contexts - Receive Commit Request

The SIENET Image Data Management DICOM application will accept Presentation Contexts as shown in the following table:

Table 17: *Accepted Presentation Contexts - Receive Storage Commitment Request*

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

3.1.3.3.3 SOP-Specific Conformance Statement - Receive Commit Request

There are only 2 different return status codes for the commitment request itself. They indicate only whether the request was successfully received or not. The real response is sent via N-EVENT-REPORT-RQ either on the same or on a different association (see 3.1.2.3).

The client application is responsible for creating a unique transaction UID. The provider will not check, whether the UID is already in use or not.

Table 18: *Return Codes*

Service Status	Meaning	Protocol Codes	Related Fields
Processing failure	processing failure without comment	0110	(0000,0902)
Success	The request was Succcessfully received	0000	none

Success or failure of storage commitment will be signalled via the N-EVENT-REPORT primitive.

3.1.3.4 Real World Activity "Receive C_FIND request"

3.1.3.4.1 Associated Real-World Activity

The associated Real-World activity is to respond to requests issued by an SCU with the query model Patient Root, Study Root and Patient/Study Only. Relational retrieve operations are supported. With a C-FIND-CANCEL request the running query can be canceled at any time.

Multiple C-FIND requests over the same association are supported.

3.1.3.4.2 Accepted Presentation Contexts - Find SCP

The SIENET Image Data Management DICOM application will accept Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Patient Root Query/Retrieve Find	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Study Root Query/Retrieve Find	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Patient/Study Only Query/ Retrieve Find	1.2.840.10008.5.1.4.1.2.3.1	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

3.1.3.4.3 SOP Specific Conformance Statement - Find SCP

The SIENET Image Data Management DICOM Query/Retrieve SCP supports hierarchical queries with all mandatory and optional search keys. The following four tables describe the search keys for the four levels of query that the SCP supports.

The SIENET Image Data Management shall support DICOM Query/Retrieve at PATIENT, STUDY, SERIES, IMAGE Level.

Table 19: *C-Find SCP: Patient Level Attributes*

Attribute name	Tag	Usage SCU	Matching
Patient Name	(0010,0010)		single value, wildcard, universal
Patient ID	(0010,0020)	U (Patient Root, Patient/ Study only) R (Study Root)	single value, wildcard, universal
Patient's Birth Date	(0010,0030)		single value, range, universal
Patient's Sex	(0010,0040)		single value, wildcard, universal
Other Patient IDs	(0010,1000)		single value, wildcard, universal, multiple values
Other Patient Names	(0010,1001)		multiple values
Ethnic Group	(0010,2160)		single value, wildcard, universal
Patient Comments	(0010,4000)		universal
Number of Patient Related Studies	(0020,1200)	returnkey only	no matching
Number ofPatient Related Series	(0020,1202)	returnkey only	no matching
Number ofPatient Related Instances	(0020,1204)	returnkey only	no matching

Table 20: *C-Find SCP: Study Level Attributes*

Attribute name	Tag	Usage SCU	Matching
Study Instance UID	(0020,000D)	U	single value, list of UID
Study ID	(0020,0010)		single value, wildcard, universal
Study Date	(0008,0020)		single value, range, universal
Study Time	(0008,0030)		single value, range, universal

Table 20: *C-Find SCP: Study Level Attributes*

Attribute name	Tag	Usage SCU	Matching
Accession Number	(0008,0050)		single value, wildcard, universal
Modalities in Study	(0008,0061)		universal, single value, multiple value
Referring Physician's Name	(0008,0090)		single value, wildcard, universal
Study Description	(0008,1030)		single value, wildcard, universal
Procedure Code Sequence	(0008,1032)		sequence matching
Number of Study Related Series	(0020,1206)	returnkey only	no matching
Number of Study Related Instances	(0020,1208)	returnkey only	no matching

Table 21: *C-Find SCP: Series Level Attributes*

Attribute name	Tag	Usage SCU	Matching
Series Instance UID	(0020,000E)	U	single value, list of UID
Series Number	(0020,0011)		single value, wildcard, universal
Modality	(0008,0060)		single value, wildcard, universal
Body Part Examined	(0018,0015)		single value, wildcard, universal
Series Date	(0008,0021)		single value, range, universal
Series Time	(0008,0031)		single value, range, universal
Series description	(0008,103E)		single value, wildcard, universal
Number of Series Related Instances	(0020,1209)	returnkey only	no matching
Referenced Performed Procedure Sequence	(0008,1111)		sequence matching
>Referenced SOP Class UID	(0008,1150)		single value, list of UID
>Referenced SOP Instance UID	(0008,1155)		single value, list of UID
Performed Procedure Step Start Date	(0040,0244)		single value, range, universal
Performed Procedure Step Start Time	(0040,0245)		single value, range, universal
Performed Procedure Step ID	(0040,0253)		single value, wildcard, universal
Performed Procedure Step Description	(0040,0254)		single value, wildcard, universal
Request Attribute Sequence	(0040,0275)		sequence matching
>Requested Procedure ID	(0040,1001)		single value, wildcard, universal
>Scheduled Procedure Step ID	(0040,0009)		single value, wildcard, universal

The following table is valid for different types of content documents (Images, SRs, GSPS, Key Image Notes). Some attributes are valid only for special instances - the usage is de-

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scribed in the Usage SCU column.

Table 22: *C-Find SCP: Instance Level Attributes*

Attribute name	Tag	Usage SCU	Matching
SOP Instance UID	(0008,0018)	U	single value, list of UID
SOP Class UID	(0008,0016)		single value, list of UID
Content Date	(0008,0023)		single value, range, universal
Content Time	(0008,0033)		single value, range, universal
Aquisition Number	(0020,0012)		single value, universal
Instance Number	(0020,0013)		single value, universal
Patient Orientation	(0020,0020)		single value, universal
Samples per Pixel	(0028,0002)		single value, universal
Photometric Interpretation	(0028,0004)		single value, universal
Number of Frames	(0028,0008)		single value, universal
Rows	(0028,0010)		single value, universal
Columns	(0028,0011)		single value, universal
Bits Allocated	(0028,0100)		single value, universal
Bits Stored	(0028,0101		single value, universal
Completion Flag	(0040,A491)	query SR	single value, universal
Concept Name Code Sequence	(0040,A043)	query SR	sequence
> Code Value	(0008,0100)	query SR	single value, universal
> Code Scheme Designator	(0008,0102)	query SR	single value, universal
> Code Scheme Version	(0008,0103)	query SR	single value, universal
> Code Meaning	(0008,0104)	query SR	single value, universal
Observation Date Time	(0040,A032)	query SR	single value, range, universal
Verifying Observer Sequence	(0040,A073)	query SR	sequence
> Verifying Organisation	(0040,A027)	query SR	single value, universal
> Verifying Date Time	(0040,A030)	query SR	single value, universal
> Verifying Observer Name	(0040,A075)	query SR	single value, universal
> Verifying Observer Identification Code Sequence	(0040,A088)	query SR	single value, universal
Referenced Request Sequence	(0040,A370)	query SR	sequence
> Study Instance UID	(0020,000D)	query SR	single value, universal
> Accession Number	(0008,0050)	query SR	single value, universal

Table 22: *C-Find SCP: Instance Level Attributes*

Attribute name	Tag	Usage SCU	Matching
> Requested Procedure ID	(0040,1001)	query SR	single value, universal
> Requested Procedure Code Sequence	(0032,1064)	query SR	single value, universal
> Code Value	(0008,0100)	query SR	single value, universal
> Code Scheme Designator	(0008,0102)	query SR	single value, universal
> Code Scheme Version	(0008,0103)	query SR	single value, universal
> Code Meaning	(0008,0104)	query SR	single value, universal
Verification Flag	(0040,A493)	query SR	single value, universal
Content Template Sequence	(0040,A504)	query SR	sequence
>Template Identifier	(0040,DB00)	query SR	single value, universal
Presentation Label	(0070,0080)	query GSPS	single value, universal
Presentation Description	(0070,0081)	query GSPS	single value, universal
Presentation Creation Date	(0070,0082)	query GSPS	single value, range, universal
Presentation Creator's Name	(0070,0084)	query GSPS	single value, universal
Referenced Series Sequence	(0008,1115)	query GSPS	sequence
> Series Instance UID	(0020,000E)	query GSPS	single value, universal, list
> Referenced Image Sequence	(0008,1140)	query GSPS	single value, universal, list
>> Referenced SOP Class UID	(0008,1150)	query GSPS	single value, universal, list
>> Referenced SOP Instance UID	(0008,1155)	query GSPS	single value, universal, list

The query attribute contents will be treated case-sensitive except all PN attributes which will always be treated case-insensitive.

The Find SCP does not return any Media File-Set IDs or UIDs, it always returns the Retrieve AET (0008,0054).

The Find SCP always returns "Instance Availability" (0008,0056).

3.1.3.4.4 Hierarchical and Relational Queries

With and without extended negotiation for relational queries, each C-FIND request is treated as if it was a relational query. The SCP allows any combination of keys at any level in the hierarchy.

Example: The Patient ID is not a unique identifier in the DICOM composite world. So it might be very helpful if the SCU can specify the Patient's Name in a C_FIND request, even if the retrieve level is IMAGE.

3.1.3.4.5 Return Codes.

The Find SCP returns following status codes:

Table 23: *C-FIND SCP Return Status*

Service Status	Meaning	Protocol Codes	Related Fields
Processing failure	Parsing or translation of the DICOM request failed(new) A response could not be generated.(new) The response could not be sent to the client The query of the database failed.	C001	(0000,0902)
Cancel	Matching terminated due to a 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

The number of matching results can be configured. In this case and for this increment the status will always be SUCCESS even if not all matches will be returned.

3.1.3.5 Real World Activity "Move SCP"

3.1.3.5.1 Associated Real-World Activity

The associated Real-World activity is to respond to retrieve requests to an SCU. The SCP supports the query models 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.

3.1.3.5.2 Accepted Presentation Contexts - Move SCP

The Siemens SIENET Cosmos DICOM application will accept Presentation Contexts as shown in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Patient Root Query/Retrieve Move	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Study Root Query/Retrieve Move	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Patient/Study Only Query/ Retrieve Move	1.2.840.10008.5.1.4.1.2.3.2	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

3.1.3.5.3 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 a remote SCP of the Storage Service Class.

Note: changed behaviour for Q/R Level

In previous versions of the SIENET Image Data Management the Q/R-Level was silently ingored and a relational query was performed. Starting with VA15A the QR Level is mandatory. Keys below the QR-Level will be rejected with code "0106".

3.1.3.5.4 Hierarchical and Relational Queries

With and without extended negotiation for relational queries each move request is treated as a relational request by ignoring attributes above the Query/Retrieve Level. Attributes below the Query/Retrieve Level are not supported.

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3.1.3.5.5 Implicit dearchiving

If objects are requested which are not online, the following steps are executed one by one:

1. An implicit dearchive task is initiated,
2. all "ONLINE" objects are transferred,
3. the completion of the dearchive task is awaited. In the meantime pending messages are sent every two seconds to the initiator.
4. Then the dearchived objects are transfered.

If some objects are not dearchived, then the return code is "B000" and the missing instances are listed in the "Failed SOP Instance UID List" (0008,0058).

Please note that the transfer of the dearchived objects is done in a second C-STORE association.

3.1.3.5.6 Return Codes

The Move SCP returns following status codes:

Table 24: *C-MOVE Return Status*

Service Status	Meaning	Protocol Codes	Related Fields
Missing Attribute	The Query Retrieve Level attribute is missing	0120	(0000,1005)
Invalid Attribute Value	Attributes below the Q/R level have been found.	0106	n/a
Processing Failure	unexpected error The complete Image Move Command had been aborted	C001	(0000,0901)
Refused	Move Destination unknown (next increment)	A801	(0000,0902)
Cancel	Sub-operations terminated due to Cancel Indication (next increment)	FE00	(0000,1020) (0000,1021) (0000,1022) (0000,1023)
Warning	Sub-operations Complete - One or more Failures or Warnings	B000	(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	(0000,1021) (0000,1022) (0000,1023)

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4 Implementation Model IWP

The SIENET Integrated Workplace contains two DICOM application entities (AEs):

- A **Query SCU** for retrieving informations from other DICOM nodes.
- A **Print SCU** for sending images to a DICOM printer.

Both Application Entities are described in the following sections.

4.1 Application Data Flow Diagram

The *syngo*® DICOM network implementation acts as SCU for the print management network service. The product target Operating System is Windows XP / 2000.

Figure 7: *Application Data Flow Diagram - Print SCU*

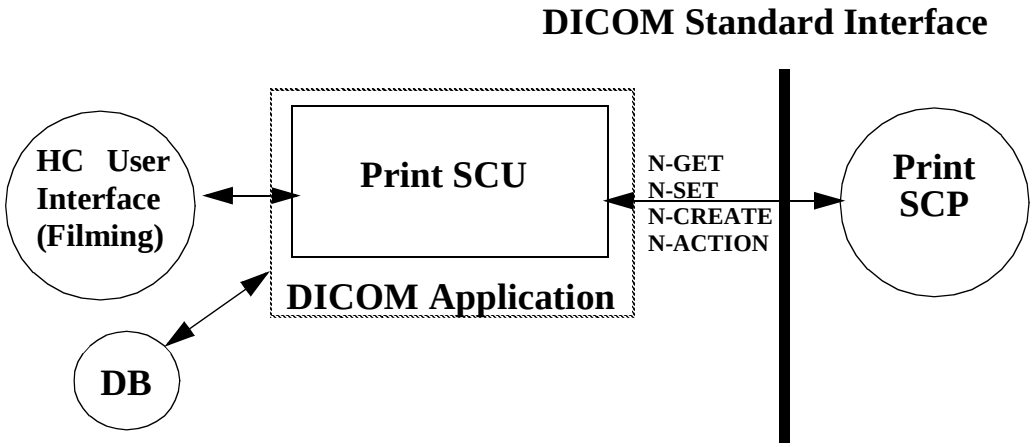
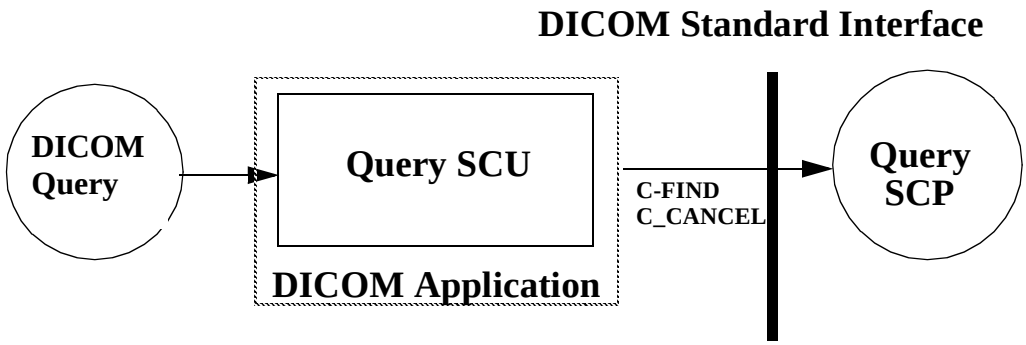


Figure 8: *Application Data Flow Diagram - Query SCU*



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4.2 Functional Definitions of Application Entities

4.2.1 Application Entity "Query"

The Query Service Classes define an application-level class of services, which facilitate the querying of Studies or Series on different DICOM nodes.

The SIENET Cosmos DICOM query SCU initiates a C-FIND DIMSE request to the remote query SCP. The Query SCP returns a list of responses with defined Data, which are displayed to the user.The user can decide to start a retrieve or do another query. The Query SCU support the Patient Root Query Model.

4.2.2 Application Entity "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 *syngo*® DICOM print application supports the print management DIMSE services to act as SCU.

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

Note

The "Print" Application Entity is optional depending on licensing and configuration.

4.3 Sequencing of Real World Activities

not applicable.

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5 AE Specifications IWP

5.1 Query Service AEs Specification

SIENET Image Data Management provides Standard Conformance to the following DICOM V3.0 SOP Classes as an SCU:

Table 25: *Retrieve SOP Classes as an 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

5.1.1 Association Establishment Policies

5.1.1.1 General

The default PDU size used will be 512 KB.

5.1.1.2 Number of Associations

1

5.1.1.3 Asynchronous Nature

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

5.1.1.4 Implementation Identifying Information

The Siemens SIENET Cosmos DICOM software provides a single Implementation Class UID of

- 1.3.12.2.1107.5.9.20000101

and an Implementation Version Name of

- SIEMENS_SWP

5.1.2 Association Initiation Policy

The Siemens SIENET Cosmos DICOM application will initiate new associations for the following DIMSE-C operations as SCU:

- C-FIND
- C-FIND-CANCEL

5.1.2.1 Real World Activity Query the Image Database of a Remote Node

5.1.2.1.1 Associated Real World Activity

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

5.1.2.1.2 Proposed Presentation Contexts

The Siemens Cosmos Workplace will propose Presentation Contexts as shown in the following table.

Table 26: *Presentation Context*

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended
Name	UID	Name List	UID List		Negotiation
Patient Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian Explicit VR Big Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	Yes

The default proposed transfer syntax is DICOM Implicit VR Little Endian Transfer Syntax. The default SOP Class UID is Patient Root Query/Retrieve Information Model.

5.1.2.1.3 SOP Specific Conformance Statement

The Cosmos Workplace query user uses hierarchical queries with retrieve level patient.

It checks for the following status codes in the Query/Retrieve provider’s response to the C-Find request:

- SUCCESS (0000): Matching is complete
- PENDING (FF00): Matches are continuing
- PENDING (FF01): Matches are continuing, no optional key support
- REFUSED (A700): Out of Resources
- CANCEL (FE00)

Supported Query/Retrieve SOP Classes as SCU for VA10A:

Table 27: *Supported Query/Retrieve SOP Classes as SCU for VA10A*

SOP Class Name	SOP Class UID
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1

Query/Retrieve SCU supports both baseline as well as extended behaviors. The Query/Retrieve levels supported are

- Patient
- Study
- Series

The following tables list the attributes at Patient, Study, and Series levels, which can be used for query as well as return values for display.

Patient Level

Table 28: *Attributes at Patient Level*

Attribute	**Tag**	**Type**	**Matching**	**User Input/Display**
Patient Name	0010,0010	R	Wildcard	Yes/Yes
Patient ID	0010,0020	U	Wildcard	Yes/Yes
Patient DOB	0010,0032	O	Universal	No/Yes

Study Level

Table 29: *Attributes at Study Level*

Attribute	**Tag**	**Type**	**Matching**	**User Input/Display**
Patient Name	0010,0010	R	Wildcard	Yes/Yes
Patient ID	0010,0020	U	Wildcard	Yes/Yes
Study Instance UID	0020,000D	U	Single value	No/No
Study Date	0008,0020	R	Universal/Range	Yes/Yes
Accession number	0008,0050	R	Universal	No/Yes
Referring Physician’s Name	0008,0090	O	Universal	No/Yes
Study Description	0008,1030	O	Universal	No/Yes

Series Level

Table 30: *Attributes at Series Level*

Attribute	Tag	Type	Matching	User Input/Display
Patient Name	0010,0010	R	Wildcard	Yes/Yes
Patient ID	0010,0020	U	Wildcard	Yes/Yes
Study Date	0008,0020	R	Universal	Yes/Yes
Referring Physician's Name	0008,0090	O	Universal	No/Yes
Series Instance UID	0020,000E	U	Single Value	No/No
Modality	0008,0060	R	Universal	Yes/Yes
Organ	0018,0015	O	Universal	Yes/Yes
Number of series related instances	0020,1209	O	Universal	No/Yes

The maximum number of query responses is configurable to limit the query time.

5.2 Print Management AE Specification

The *syngo*® print management SCU (HCS) invokes print management DIMSE services to transfer images from the local AE to the remote SCP AE to print images with a defined layout on a selected network-based DICOM hardcopy printer. This is done in an "full-page" print mode.

SIEMENS *syngo*® DICOM products provide Standard Conformance to the following DICOM V3.0 Print Management Meta SOP Classes as an SCU:

Table 31: *Print Management Meta SOP Classes as an SCU*

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

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

5.2.1 Association Establishment Policies

5.2.1.1 General

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

The default PDU size used will be 28 KB.

5.2.1.2 Number of Associations

The *syngo*® DICOM Print application initiates one association at a time for each different print device configured.

5.2.1.3 Asynchronous Nature

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

5.2.1.4 Implementation Identifying Information

The Siemens SIENET Cosmos DICOM software provides a single Implementation Class UID of

Implementation Class UID	1.3.12.2.1107.5.9.20000101
Implementation Version Name	SIEMENS_SWP

5.2.2 Association Initiation Policy

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

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

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

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

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5.2.2.1 Real World Activity

5.2.2.1.1 Associated Real-World Activity - Printing a Printer Job Queue Entry

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

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

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

5.2.2.1.2 Proposed Presentation Contexts

The Siemens *syngo*® DICOM application will propose Presentation Contexts as shown in the following table.

Table 32: *Presentation Context*

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

5.2.2.1.3 SOP Specific Conformance Statement - Meta SOP Classes

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

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

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

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

5.2.2.1.3.1 Basic Film Session SOP class

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

The *syngo*® DICOM print management SCU supports the following DIMSE Service elements for the Basic Film Session SOP Class as SCU:

- N-CREATE, N-DELETE

The Basic Film Session SOP Class N-CREATE-RQ (SCU) uses the following attributes:

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

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

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

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

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

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

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

5.2.2.1.3.2 Basic Film Box SOP class

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

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

Supported Service Elements as SCU are:

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

The Basic Film Box SOP class N-CREATE-RQ message uses the following attributes (the actual values for each attribute depend on DICOM printer configuration within the *syngo*® DICOM print management SCU):

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
Magnification Type	(2010,0060)	M	BILINEAR, CUBIC, NONE, REPLICATE
Border Density	(2010,0100)	U	BLACK, WHITE
Max Density	(2010,0130)	U	0 < Value
Min Density	(2010,0120)	U	0 < Value < 50
Illumination	(2010,015E)	U	0 < Value Required if Presentation LUT is present.
Reflective Ambient Light	(2010,0160)	U	0 < Value Required if Presentation LUT is present.
Referenced Presentation LUT Sequence	(2050,0500)	U	

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

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

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

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

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The Basic Film Box SOP class interprets the following status codes:

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

5.2.2.1.3.3 Basic Grayscale Image Box SOP Class

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

The Grayscale Image Box SOP Class uses only the N-SET-RQ with the following 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
> 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 interpret the following status codes:

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

5.2.2.1.3.4 Basic Color Image Box SOP Class

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

The Color Image Box SOP Class uses only the N-SET-RQ with the following 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 interpret the following status codes:

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

5.2.2.1.3.5 Presentation LUT SOP Class

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

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

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

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

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

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

The Presentation LUT SOP class interprets the following status codes:

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

5.2.2.1.3.6 Printer SOP Class

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

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

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

- N-GET as SCU
  N-EVENT-REPORT as SCU In both cases the following information is supported:

Used Printer N-EVENT Report attributes

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

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 tables in Annex for details.

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

5.2.2.1.3.7 Print Job SOP Class

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

The *syngo*® DICOM Print Management application supports the optional N-EVENT-REPORT DICMSE Service to receive the changes of the Print Job Status in an asynchronous way.

It can receive Events from the Print SCP asynchronously

Note: *syngo*® does not support receiving N-EVENT from camera during print sessions, normally this is configurable in the camera.

N-EVENT-REPORT The following information is supported:

Used Print Job N-EVENT Report attributes

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
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

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

5.2.3 Association Acceptance Policy

not applicable.

6 Communication Profiles

6.1 Supported Communication Stacks

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

6.1.1 OSI Stack

not supported.

6.1.2 TCP/IP Stack

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

6.1.2.1 API

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

6.1.2.2 Physical Media Support

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

6.1.3 Point-to-Point Stack

not supported.

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7 Extensions/Specializations/ Privatizations

7.1 Standard Extended/Specialized/Private SOPs

Not applicable.

7.2 Private Transfer Syntaxes

Not applicable.

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8 Configuration

8.1 Configuration of SIENET Image Data Management

8.1.1 AE Title / Presentation Address Mapping

To ensure unique identification within the network the hostname should be used as part of the AE Titles (see examples below, hostname = axwsca1). The string can be up to 16 characters and must not contain any extended characters. Only 7-bit ASCII characters (excluding Control Characters) are allowed according to DICOM Standard.

8.1.1.1 AE Title

The SIENET Image Data Management DICOM application provides a single application entity title which can be configured:

SDM_$HOSTNAME (default)

The port number is set to the default value(configurable) of

2002

8.1.2 Configurable Parameters

The Application Entity Titles, host names and port numbers of remote nodes are configured using the SIENET Cosmos Service software.

The current implementation uses aet-nameservice.xml to configure remote DICOM nodes. New AETs can be inserted without restarting the process.

8.1.3 Default Parameters

This installation tool also uses some default parameters:

- max PDU size set to 28672 Bytes
- time-out for accepting/rejecting an association request: 30 s
- time-out for responding to an association open/close request: 15 s
- time-out for accepting a message over network: 15 s
- time-out for waiting for data between TCP/IP-packets: 15 s

The time-outs for waiting for a Service Request/Response message from the remote node are as follows:

- for Storage SCP/SCU: 600 s
- for Query/Retrieve SCP/SCU: 600 s
- number of image collection before saving to database maximagecounter=20
- activate MPPS Simulation disablemppssimulate=true
- max matches querylimit=unlimited
- max number of parallel associations: 50

8.2 Configuration of SIENET Integrated Workplace

The following configuration depends on the type of SIENET Integrated Workplace and aquired software licenses.

8.2.1 AE Title/Presentation Address Mapping

To ensure unique identification within the network the hostname should be used as part of the AE Titles (see examples below, hostname = name1). The string can be up to 16 characters long and must not contain any extended characters, only 7-bit ASCII characters (excluding Control Characters) are allowed according to DICOM Standard.

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

8.2.1.1 DICOM Storage AE Title

Within syngo there are local application entity titles for Study Transfer and Print. They can be configured via Service-UI in Configuration / DICOM / General (e.g. STU_NAME1).

The port number is set to the fixed value of 104.

8.2.1.2 DICOM Query SCU AE Title

The DICOM Query/Retrieve application uses a fixed AE Title:

SIRIUS_WORKPLACE

8.2.1.3 DICOM Print AE Title

The DICOM Print application provides the application entity title:

e.g. PRI_NAME1 (No input of AETs starting with a numeric character is possible)

8.2.2 Configurable Parameters

The Application Entity Titles, host names and port numbers for remote AE are configured using the SIENET Integrated Workplace Service Software. For each AET the list of services supported can be configured.

8.2.3 Storage

The SIENET Integrated Workplace Service Software can be used to set the AET's, port-numbers, host-names, IP-addresses and capabilities for the remote nodes (SCP's). The user can select transfer syntaxes, compression modes and query models for each SCP separately.

- a quality factor which determines the proposed transfer syntax in case that an user has initiated the C-STORE. By convention, 0 means: Only Uncompressed Transfer Syntax(es) are proposed, 100 means: Lossless Transfer Syntax is proposed, and any other value between 1 and 99 means that an JPEG Lossy Transfer Syntax is proposed. One Uncompressed Transfer Syntax will be proposed in any case. This parameter is general for all destination nodes.
- a "compression type supported" which determines the proposed transfer syntax in case that the C-STORE was initiated as a sub-operation of an incoming C-MOVE-RQ. By convention, 0 means: Only Uncompressed Transfer Syntax(es) are proposed, 1 means: Lossless Transfer Syntax is proposed, and 2 means that an JPEG Lossy Transfer Syntax is proposed. One uncompressed transfer syntax will be proposed in any case. This parameter can be set for each configured destination node.

8.2.4 Print

- The SIENET Integrated Workplace Service Software can be used to configure the SCP (DICOM-Printer).

These parameters are mandatory to set:

- AET,
- host-name,
- IP-address and
- Port-number.

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

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

- film destination.

8.2.5 Default Parameters

- This installation tool also uses some default parameters:
- max PDU size set to 262144 Bytes (256 kB)
- 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 Service Request/Response message from the remote node are as follows:
- for Storage SCU: 600 s
- time-out for Response to N-ACTION: 600 s
- for Query SCU: 600 s
- for Print Management SCU:
- time-out for Response to N-SET-RQ: 240 s
- time-out for Response to other Requests: 60 s

9 Support of Extended Character Sets

The SIENET Image Data Management DICOM application supports the ISO 8859 Latin 1 (ISO-IR 100) character set.

The SIENET Integrated Workplace DICOM application supports the ISO 8859 Latin 1 (ISO-IR 100) character set.

When there is a mismatch between the SCS tags (0008,0005) and the characters in an IOD received by the system, then the following measures are taken to make the characters DICOM con-form:

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

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B) Media Storage Conformance Statement

This chapter will contain the Conformance Statement to all “Offline Media Application Profiles (incl. private extentions)” supported by the Cosmos Media options.

Those application profiles supported shall be:

- Standard Application Profiles
- Augmented Application Profiles
- *syngo*® private Application Profile
- General Purpose CDR Profile

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10 Introduction

10.1 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 Cosmos based on *syngo*® software[1]. The Cosmos DICOM offline media storage service implementation acts as FSC, FSU and/or FSR for the specified application profiles and the related SOP Class instances.

10.2 Scope

This DICOM Conformance Statement refers to SIEMENS Cosmos based products using Cosmos software. The following table relates Cosmos software names to SIEMENS products:

Software Name	**SIEMENS *syngo*®-based Product**
VA10A	Cosmos

10.3 Definitions, Abbreviations

10.3.1 Definitions

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

10.3.2 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

1. *syngo* is a registered trademark of Siemens AG.

LEONARDO	AX-Workstation (for Angiographic/Radiographic viewing)
MOD	Magneto-optical Disk
NEMA	National Electrical Manufacturers Association
O	Optional Key Attribute
PDU	DICOM Protocol Data Unit
R	Required Key Attribute
RWA	Real-World Activity
U	Unique Key Attribute

10.4 References

[6] Digital Imaging and Communications in Medicine (DICOM) 3.0, NEMA PS 3.1-15, 2000

10.5 Remarks

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

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

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

The user should be aware of the following important issues:

- The comparison of different conformance statements is the first step towards assessing interconnectivity between Siemens and non-Siemens equipment.
- Test procedures should be defined and tests should be performed by the user to validate the connectivity desired. DICOM itself and the conformance parts do not specify this.
- The standard will evolve to meet the users' future requirements. Siemens is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.
- Siemens reserves the right to modify the design and specifications contained herein without prior notice. Please contact your local Siemens representative for the most recent product information.

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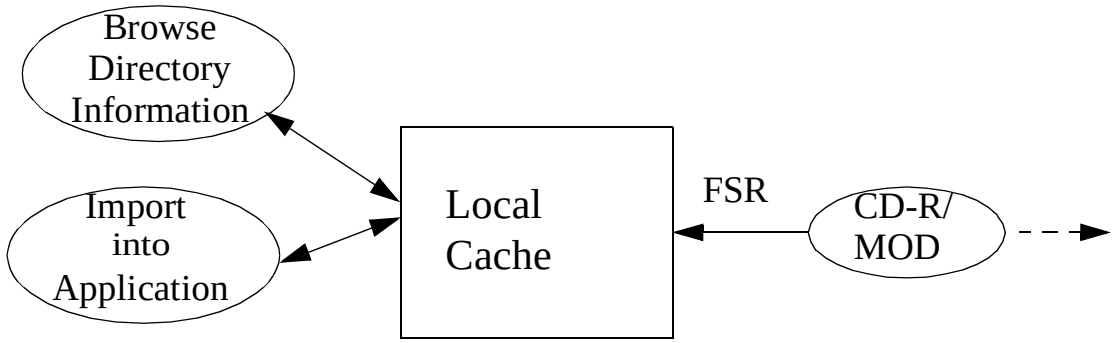
11 Implementation Model

11.1 Application Data Flow Diagram

Figure 9: *Application Data Flow Diagram - Media*



The Cosmos application will serve as an interface to the CD-R offline medium device. It serves interfaces to include the offline media directory into the browser and to copy SOP instances to the Viewing Application.

The Cosmos application will support the 120mm CD-R medium, the 130mm 2.3 GB R/W MOD and the 130mm 4.1 GB R/W MOD.

11.2 Functional Definitions of AEs

The Cosmos DICOM offline media storage application consists of the DICOM Archive application entity serving all interfaces to access offline media. The DICOM Archive application is capable of

5. importing SOP Instances from the medium onto local storage
6. reading the File-sets DICOMDIR information into temporary database and pass it to display applications.

11.3 Sequencing of Real-World Activities

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

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11.4 File Meta Information Options

Table 33: *Implementation Class/Version Name - Media*

Implementation Class UID	1.3.12.2.1107.5.9.20000101
Implementation Version Name	SIEMENS_SWP

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12 AE Specifications

12.1 DICOM Archive Specification

The DICOM Archive provides Standard conformance to Media Storage Service Class (Interchange Option). In addition Augmented conformance is provided to store extra data attributes important for the full feature support of the Cosmos product SW. Details are listed in following table:

Table 34: *Media - Application Profiles and Real-World Activities*

Application Profiles Supported	Real-World Activity	Role	SC Option
PRI-SYNGO-CD PRI-SYNGO-MOD23 (option) PRI-SYNGO-MOD41 (option) PRI-SYNGO-DVD-RAM PRI-SYNGO-FD AUG-GEN-CD AUG-CTMR-MOD650 *1 AUG-CTMR-MOD12 *1 AUG-CTMR-MOD23 *1 AUG-CTMR-CD *1 AUG-XA1K-CD *1	Browse Directory Information	FSR	Interchange
	Import into Application	FSR	Interchange
STD-GEN-CD STD-CTMR-MOD650 STD-CTMR-MOD12 STD-CTMR-MOD23 STD-CTMR-CD STD-XABC-CD STD-XA1K-CD STD-US-zz-yF-xxxxxx *2 STD-WVFM-GEN-FD	Browse Directory Information	FSR	Interchange
	Import into Application	FSR	Interchange

*1 – With no Private SOP Class used, the PRI-SYNGO-CD profile definitions are appropriate to describe the augmentation of the related -STD Profiles.

*2 - All combinations of the following values for xx, yF and xxxxxx are supported: yF={SF|MF}, xx={ID|SC|CC}, xxxxxx={FLOP|MOD128| MOD230|MOD540|MOD650|MOD12|MOD23|DVD-RAM|CDR}

On *syngo*®-based products the Private Extended *syngo*® Profile (PRI-SYNGO-CD) will be preferably used by the system. The General Purpose Interchange Profile (STD-GEN-CD), Ultrasound Profile (STD-US-xxx), CT and MR Image Profile (STD-CTMR-xxx), Waveform In-

terchange (STD-WVFM-xxx), Basic Cardiac Profile (STD-XABC-CD) and 1024 X-Ray Angiographic Profile (STD-XA1K-CD) will be supported with read capability of the related media.

12.1.1 File Meta Information for the Application Entity

The Source Application Entity Title is set by configuration. See Chapter “Configuration” for details.

12.1.2 Real-World Activities for this Application Entity

12.1.2.1 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 those directory entries, that are valid for the application profiles supported, into a local database. The database can the then be used for browsing media contents.

Note

IconImageSQ is also supported in DICOMDIR. But only those Icon Images with BitsAllocated (0028,0100) equal to 8 and size of 64x64 or 128x128 pixels are imported into database and are visible in the Browser.

12.1.2.1.1 Application Profiles for the RWA: Browse Directory Information

See Table in section 3.1 for the Application Profiles listed that invoke this Application Entity for the Browse Directory Information RWA.

12.1.2.2 Real-World Activity: Import into Application

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

The SOP Instance selected from the media directory will be copied into the running Application. Only SOP Instances, that are valid for the application profile, can be retrieved from media storage.

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

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

Table 35: *Media FSR - Supported SOP Classes*

Information Object Definition	SOP Class UID	Transfer Syntax UID
CR Image	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
CT image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
DX Image-For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
IOX Image-For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
MG Image-For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
NM Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
PET Image	1.2.840.10008.5.1.4.1.1.128	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
RT Image	1.2.840.10008.5.1.4.1.1.481.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
Ultrasound Image (retired)	1.2.840.10008.5.1.4.1.1.6	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
Ultrasound Multi-frame Image (retired)	1.2.840.10008.5.1.4.1.1.3	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1
CSA Non-Image	1.3.12.2.1107.5.9.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1

13 Augmented and Private Profiles

13.1 Augmented Application Profiles

13.1.1 AUG-GEN-CD

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

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

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

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14 *syngo*® private offline Media Application Profile

Will contain a *syngo*® specific Application Profile.

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

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

14.1 Class and Profile Identification

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

The identifier for this class shall be PRI-SYNGO. This class is intended to be used for interchange of extended and private Information Objects via CD-R or re-writeable magneto-optical disk (MOD) offline media between dedicated acquisition or workstation modalities build from a common *syngo*® architecture.

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

Table 36: *PRI-SYNGO - Application Profiles*

Application Profile	Identifier	Description
"*syngo* speaking" System on CD-R	PRI-SYNGO-CD	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).
"*syngo* speaking" System on 2.3 GB MOD	PRI-SYNGO-MOD23	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).
"*syngo* speaking" System on 4.1 GB MOD[a]	PRI-SYNGO-MOD41	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).
"*syngo* speaking" System on 4.7 GB DVD RAM	PRI-SYNGO-DVD-RAM	Handles interchange of Composite SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).
"*syngo* speaking" System on Floppy Disk	PRI-SYNGO-FD	Handles interchange of Waveform SOP Instances and privately defined SOP Instances (Siemens Non-Image IOD).

a. Definition of this profile is done due to approval of DICOM Supplement 62.

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

1. *syngo* is a registered trademark of Siemens AG.

14.1.1 Roles and Service Class Options

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

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

14.1.1.1 File Set Reader

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

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

14.2 PRI-SYNGO Profiles

14.2.1 SOP Classes and transfer Syntaxes

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

Table 37: *PRI-SYNGO - Supported SOP Classes*

Information Object Definition	SOP Class UID	Transfer Syntax UID	FSR
Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
CR Image	1.2.840.10008.5.1.4.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
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	M
CR Image	1.2.840.10008.5.1.4.1.1.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
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	O
CR Image	1.2.840.10008.5.1.4.1.1.1	RLE Lossless 1.2.840.10008.1.2.5	O
CT image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M

Table 37: *PRI-SYNGO - Supported SOP Classes*

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	M
CT Image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
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	O
CT Image	1.2.840.10008.5.1.4.1.1.2	RLE Lossless 1.2.840.10008.1.2.5	O
DX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
DX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M
DX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
DX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O
DX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.1	RLE Lossless 1.2.840.10008.1.2.5	O
MG Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
MG Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M
MG Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
MG Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O
MG Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	RLE Lossless 1.2.840.10008.1.2.5	O
IOX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
IOX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M
IOX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
IOX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O

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Table 37: *PRI-SYNGO - Supported SOP Classes*

IOX Image – For Presentation	1.2.840.10008.5.1.4.1.1.1.3	RLE Lossless 1.2.840.10008.1.2.5	O
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
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	M
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
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	O
MR Image	1.2.840.10008.5.1.4.1.1.4	RLE Lossless 1.2.840.10008.1.2.5	O
NM Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
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	M
NM Image	1.2.840.10008.5.1.4.1.1.20	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
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	O
NM Image	1.2.840.10008.5.1.4.1.1.20	RLE Lossless 1.2.840.10008.1.2.5	O
PET Image	1.2.840.10008.5.1.4.1.1.128	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
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	M
PET Image	1.2.840.10008.5.1.4.1.1.128	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
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	O
PET Image	1.2.840.10008.5.1.4.1.1.128	RLE Lossless 1.2.840.10008.1.2.5	O
RT Image	1.2.840.10008.5.1.4.1.1.481.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
RT Image	1.2.840.10008.5.1.4.1.1.481.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M
RT Image	1.2.840.10008.5.1.4.1.1.481.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M

Table 37: *PRI-SYNGO - Supported SOP Classes*

RT Image	1.2.840.10008.5.1.4.1.1.481.1	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	O
RT Image	1.2.840.10008.5.1.4.1.1.481.1	RLE Lossless 1.2.840.10008.1.2.5	O
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
Secondary Capture 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	M
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
Secondary Capture 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	O
Secondary Capture Image	1.2.840.10008.5.1.4.1.1.7	RLE Lossless 1.2.840.10008.1.2.5	O
Ultrasound Image (retired)	1.2.840.10008.5.1.4.1.1.6	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
Ultrasound Image (retired)	1.2.840.10008.5.1.4.1.1.6	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M
Ultrasound Image (retired)	1.2.840.10008.5.1.4.1.1.6	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
Ultrasound Image (retired)	1.2.840.10008.5.1.4.1.1.6	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	M
Ultrasound Image (retired)	1.2.840.10008.5.1.4.1.1.6	RLE Lossless 1.2.840.10008.1.2.5	M
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
Ultrasound 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	M
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
Ultrasound 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	M
Ultrasound Image	1.2.840.10008.5.1.4.1.1.6.1	RLE Lossless 1.2.840.10008.1.2.5	M
Ultrasound Multi-frame Image (retired)	1.2.840.10008.5.1.4.1.1.3	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M

Table 37: *PRI-SYNGO - Supported SOP Classes*

Ultrasound Multi-frame Image (retired)	1.2.840.10008.5.1.4.1.1.3	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M
Ultrasound Multi-frame Image (retired)	1.2.840.10008.5.1.4.1.1.3	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
Ultrasound Multi-frame Image (retired)	1.2.840.10008.5.1.4.1.1.3	JPEG Lossy (baseline or extended) 1.2.840.10008.1.2.4.50 1.2.840.10008.1.2.4.51	M
Ultrasound Multi-frame Image (retired)	1.2.840.10008.5.1.4.1.1.3	RLE Lossless 1.2.840.10008.1.2.5	M
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
Ultrasound Multi-frame 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	M
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
Ultrasound Multi-frame 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	M
Ultrasound Multi-frame Image	1.2.840.10008.5.1.4.1.1.3.1	RLE Lossless 1.2.840.10008.1.2.5	M
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
X-Ray Angiographic 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	O
X-Ray Angiographic Image	1.2.840.10008.5.1.4.1.1.12.1	RLE Lossless 1.2.840.10008.1.2.5	M
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	M
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M
X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Big Endian Uncompressed 1.2.840.10008.1.2.2	M
X-Ray Radiofluoroscopic 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	O

Table 37: *PRI-SYNGO - Supported SOP Classes*

X-Ray Radiofluoroscopic Image	1.2.840.10008.5.1.4.1.1.12.2	RLE Lossless 1.2.840.10008.1.2.5	M
CSA Non-Image	1.3.12.2.1107.5.9.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	M

FSR – denote the requirements for those role

O – Optional

M - Mandatory

14.2.2 Physical Media and Formats

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

14.2.3 Directory Information in DICOMDIR

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

Note

DICOMDIRs with no directory information are not allowed by this Application Profile

Privately defined IODs will be referenced by “PRIVATE” Directory Records.

14.2.3.1 Basic Directory IOD Specialization

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

The Descriptor Files shall have the following contents:

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

“MULTIVOLUME: xx of yy”

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

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

14.2.3.2 Additional Keys

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

Table 38: *PRI-SYNGO-CD Additional DICOMDIR Keys*

Key Attribute	Tag	Directory Record Level	Type	Notes
Date of Birth	(0010,0030)	PATIENT	2C	required, if present in SOP Instance
Patient’s Sex	(0010,0040)	PATIENT	2C	required, if present in SOP Instance
Series Date	(0008,0021)	SERIES	3	
Series Time	(0008,0031)	SERIES	3	
Institute Name	(0008,0080)	SERIES	2C	required, if present in SOP Instance
Institution Address	(0008,0081)	SERIES	2C	required, if present in SOP Instance
Series Description	(0008,103E)	SERIES	3	
Performing Physician’s Name	(0008,1050)	SERIES	2C	required, if present in SOP Instance
Image Type	(0008,0008)	IMAGE	1C	required, if present in SOP Instance
SOP Class UID	(0008,0016)	IMAGE	3	
SOP Instance UID	(0008,0018)	IMAGE	3	
Image Date	(0008,0023)	IMAGE	3	
Image Time	(0008,0033)	IMAGE	3	
Referenced Image Sequence	(0008,1140)	IMAGE	1C	required, if present in SOP Instance
> Referenced SOP Class UID	(0008,1150)			
> Referenced SOP Instance UID	(0008,1155)			
Image Position (Patient)	(0020,0032)	IMAGE	2C	required, if present in SOP Instance
Image Orientation (Patient)	(0020,0037)	IMAGE	2C	required, if present in SOP Instance
Frame of Reference UID	(0020,0052)	IMAGE	2C	required, if present in SOP Instance
Rows	(0028,0010)	IMAGE	3	
Columns	(0028,0011)	IMAGE	3	
Pixel Spacing	(0028,0030)	IMAGE	1C	required, if present in SOP Instance

Table 38: *PRI-SYNGO-CD Additional DICOMDIR Keys*

Calibration Image	(0050,0004)	IMAGE	2C	required, if present in SOP Instance
Icon Image Sequence	(0088,0200)	IMAGE	3	required for Image SOP Classes
> Samples per Pixel	(0028,0002)			1
> Photometric Interpretation	(0028,0004)			MONOCHROME2
> Rows	(0028,0010)			128 for XA, 64 for others
> Columns	(0028,0011)			128 for XA, 64 for others
> Bits Allocated	(0028,0100)			8
> Bits Stored	(0028,0101)			8
> High Bit	(0028,0102)			7
> Pixel Representation	(0028,0103)			0
> Pixel Data	(7FE0,0010)			Icon Image
Curve Number	(0020,0024)	CURVE	1C	required, if present in SOP Instance

14.2.3.3 Private Directory Record Keys

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

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

Table 39: *PRI-SYNGO-CD additional keys for Private Directory Records*

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

14.2.3.4 Icon Images

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

PRIVATE Directory Records will not contain Icon Image information.

14.2.4 Other Parameters

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

14.2.4.1 Multi-Frame JPEG Format

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

14.2.4.2 Attribute Value Precedence

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

Note

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

15 Configuration

15.1 AE Title Mapping

15.1.1 DICOM Media Storage AE Title

The DICOM Storage application provides the application entity title:

CsaImageManager

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16 Support of Extended Character Sets

The Siemens Cosmos DICOM application supports the ISO 8859 Latin 1 (ISO-IR 100) character set.

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

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

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