SIEMENS

SIENET

SHS

DICOM Conformance Statement

MagicServe / MagicLink D(VA20C)

Rev. 2.0

29-May-1998

A. Feihl
PACS E 2

Author	Approved by
Name/Dept.:	Name/Dept.: .....
Date:	Date: .....
Signature:	Signature: .....

History

Document History

Version	Date of Issue	Author	Change & Reason of Change/ Change Request
0.1	16-Jul-1997	R.Höcker	initial version
1.0	29-Jul-1997	R.Höcker	after review
1.1	29-May-1998	A. Feihl	changes for SW version VA20C
2.0	29-May-1998	A. Feihl	released version after review

Review History

Version	Review Date	Review Document/Protocol
0.1	25-Jul-1997	changes see Review Protocol
1.1	29-May-1998	released without changes

Table of Contents

Introduction

0.1 Purpose

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

This conformance statement describes the DICOM Interface of SIENET MagicServe / MagicLink D running Software Version VA20B/C.

The SIENET MagicServe / MagicLink D both translates between a DICOM and a Siemens/PACSnet network and allows to export image data via wide area networks.

The SIENET MagicServe / MagicLink D acts as a service class provider and user (SCP/SCU) for Storage Service Class and Verification Service Class.

0.2 Definitions, Acronyms and Abbreviations

ACR	**A**merican **C**ollege of **R**adiology
AE	DICOM **A**pplication **E**ntity
Folder	Siemens specific name for a set of (ACR-NEMA/SPI) images, corresponds to a DICOM Study Component
IOD	DICOM **I**nformation **O**bject **D**efinition
NEMA	**N**ational **E**lectrical **M**anufacturers **A**ssociation
PDU	**P**rotocol **D**ata **U**nit
PLA	**P**acsnet **L**ogical **A**ddress (to identify an application on a PACSnet node)
SCU	DICOM **S**ervice **C**lass **U**ser (client using this DICOM service)
SCP	DICOM **S**ervice **C**lass **P**rovider (server providing this service)

SOP	**S**ervice/**O**bject **P**air
UID	**U**nique **ID**entifier, string unique in the whole network

0.3 References

[1] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-9, 1993

1 Implementation Model

The Siemens MagicServe / MagicLink D is implemented to support 8 DICOM Application Entities (AEs) as SCP which receive associations from remote Application Entities.

Each of them correspond to a single PACSnet node, i.e. images sent to a specific AE of the DICOM Gateway are forwarded to that PACSnet node corresponding to that AE.

The Siemens MagicServe / MagicLink D Application Entity originates associations for Storage of DICOM Composite Information Objects in Remote Application Entities.

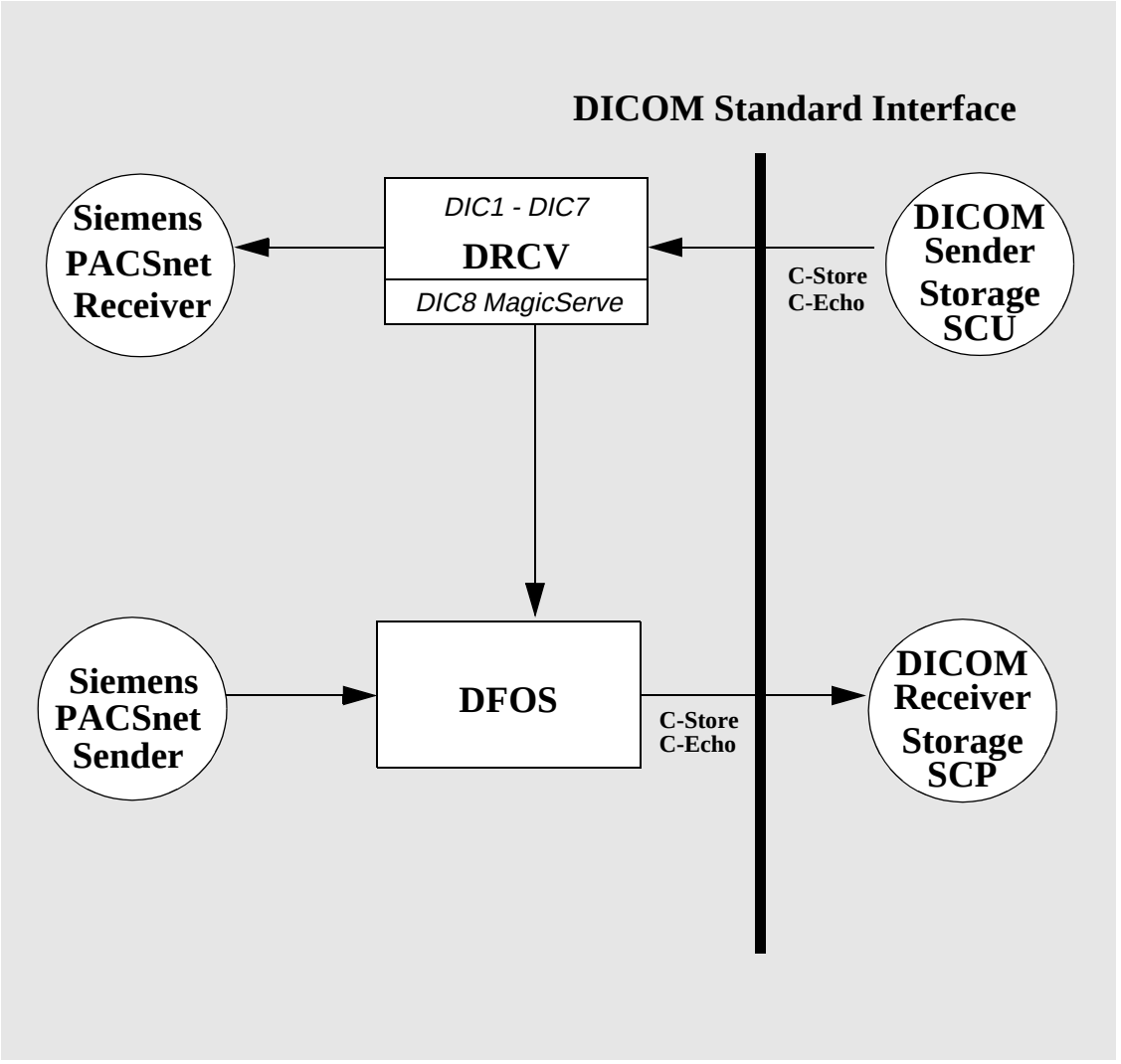
1.1 Application Data Flow Diagram

DRCV (DICOM Receiver for DICOM Image Storage) and DFOS (DICOM Folder Sender for Image Storage) are applications to handle the DICOM communication.

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

- A remote Application Entity (AE) initiates an association for the DICOM Storage Service Class to one of the 8 AEs of DRCV. Upon acceptance of the association by DRCV the remote AE transmits the DICOM Information Objects to DRCV. DRCV receives each object and converts it into the ACR/NEMA format. After all objects for that association have been received and the association closed by the remote AE, DRCV initiates the PACSnet transfer of the ACR/NEMA data sets to the remote PACSnet node (configured for the AE of DRCV the association was connected to).
- DFOS initiates associations for DICOM Storage Service Class to remote AEs. For each folder being sent to a remote DICOM node a new association to the corresponding remote DICOM AE is initiated. The DICOM objects are sent via that open association.

Figure 1: Application Data Flow Diagram



1.2 Functional Definitions of Application Entities

All components of the Siemens DICOM Interface (including DRCV, DFOS) are operating as background daemon processes. They start, when the machine is powered on and wait for tasks.

DRCV acting as a SCP is waiting for association requests from a remote DICOM client. The Application Entity Titles and the Port Numbers the SCP are listening on, are taken from the local configuration.

DFOS acting as a SCU is waiting for requests either from other local daemon processes (i.e. a new folder coming in via PACSnet) or for requests from MagicServe UI user. When a request is received, DFOS initiates an association with a remote Application Entity.

1.3 Sequencing of Real World Activities

not applicable.

2 Application Entity Specifications

2.1 AE Specification

DRCV provides 8 Application Entities. According to which AE of DRCV the images are sent, they are forwarded after conversion to the PACSnet node configured for that AE.

DFOS provides only one AE which is used when initiating associations to remote DICOM nodes.

The Siemens MagicServe / MagicLink D provides Standard Conformance to the following DICOM Storage SOP Classes as an SCU and SCP:

Storage SOP Classes as an SCU and SCP

- ❏ CR (Computed Radiography) Image Storage
- ❏ CT Image Storage
- ❏ Ultrasound Image Storage
- ❏ MR Image Storage
- ❏ SC Image Storage
- ❏ NM Image Storage
- ❏ X-Ray Angiographic Image Storage
- ❏ X-Ray Radiofluoroscopic Image Storage

The Siemens MagicServe / MagicLink D provides Standard Conformance to the following DICOM Verification SOP Classes as an SCU and SCP:

Verification SOP Classes as an SCU and SCP

- ❏ Verification

2.1.1 Association Establishment Policies

2.1.1.1 General

The configuration of the Siemens MagicServe / MagicLink D defines the Application Entity Titles, the port numbers and the host name and net address.

2.1.1.2 Number of Associations

DFOS initiates several associations at a time, one for each transfer request being processed. There may be several concurrent associations initiated by FOS active at a time, which are processed in parallel. The number of associations can be configured.

Each DRCV accepts multiple associations from different remote DICOM AEs at a time. There may be several concurrent associations active and processed in parallel.

2.1.1.3 Asynchronous Nature

This version of the software does not support asynchronous communication (multiple outstanding transactions over a single association).

2.1.1.4 Implementation Identifying Information

The Siemens MagicServe / MagicLink D provides an Implementation Class UID of

❏ “1.3.12.2.1107.5.8.1”

and an Implementation Version Name of

❏ “Siemens_SIENET_1”.

2.1.2 Association Initiation Policy

The Siemens MagicServe / MagicLink D attempts to initiate a new association for

- DIMSE-C-STORE

service operations.

2.1.2.1 Real-World Activity - Send Image Objects to a Remote Node

2.1.2.1.1 Associated Real-World Activity - Send Image Objects to a Remote Node

The associated Real-World activity is a C-Store request initiated by the internal daemon process DFOS. If DFOS successfully establishes an association to a remote Application Entity, it will convert and then transfer each image of that folder one after another via the open association. If the C-Store Response from the remote Application contains a status other than Success the association is aborted and after a configured time period the transfer of the whole folder started again. If the Retry also fails the folder will remain on the DICOM Gateway with status Aborted.

The DICOM targets are configured at configuration time. At that time it is also specified which PACSnet channels of the DICOM Gateway correspond to which DICOM targets.

2.1.2.1.2 Proposed Presentation Contexts

The Siemens MagicServe / MagicLink D will propose Presentation Contexts as shown in the following tables.

Table 1: Send SCU Presentation Contexts

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**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCU	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.**2**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCU	None
US MF Image Storage Retired	1.2.840.10008.5.1.4.1.1.**3**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2 1.2.840.10008.1.2.2 1.2.840.10008.1.2.1	SCU	None

US MF Image Storage	1.2.840.10008.5.1.4.1.1.**3.1**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCU	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.**4**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCU	None
Ultrasound Image Storage Retired	1.2.840.10008.5.1.4.1.1.**6**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCU	None

Ultrasound Image Storage	1.2.840.10008.5**.** 1.4.1.1.**6.1**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCU	None
SC Image Storage	1.2.840.10008.5**.** 1.4.1.1.**7**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCU	None
NM Image Storage	1.2.840.10008.5**.** 1.4.1.1.**20**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCU	None

X-Ray Angiographic Image- Storage	1.2.840.10008.5.1.4.1.1.**12.1**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCU	None
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.**12.2**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCU	None

The default proposed transfer syntax is DICOM Implicit VR Little Endian Transfer Syntax.

2.1.2.1.3 SOP Specific Conformance Statement

The DICOM images sent by the Siemens MagicServe / MagicLink D conform to the DICOM IOD definitions (Standard extended IODs).

Siemens image objects (as well as images from other manufacturers) may contain additional private elements which have to be discarded by a DICOM system when modifying the image.

The DICOM nodes are responsible for data consistency when modifying images. All unknown private attributes have to be removed upon modification!

Multiframe images with only 1 frame can be displayed on a Magic-View.

2.1.3 Association Acceptance Policy

The Siemens MagicServe / MagicLink D accepts a new association for

- ❏ DIMSE-C-Echo
- ❏ DIMSE-C-Store

service operations.

2.1.3.1 Real-World Activity - Receive Echo

2.1.3.1.1 Associated Real-World Activity - respond to echo request

The associated Real-World activity is a C-Echo response by the DRCV.

2.1.3.1.2 Proposed Presentation Contexts

The Siemens MagicServe / MagicLink D will accept Presentation Contexts as shown in the following table.

Table 2: Echo SCP Presentation Contexts

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

2.1.3.1.3 SOP Specific Conformance to the Verification SOP Class

The MagicServe / MagicLink D provides standard conformance to the DICOM Verification Service Class.

2.1.3.2 Real-World Activity - Receive Image Objects from a Remote Node

2.1.3.2.1 Associated Real-World Activity -Receive Image Objects from a Remote Node

The associated Real-World activity is a C-Store request received by the internal daemon process DRCV. After accepting an association from a remote DICOM AE the DRCV process receives the images via that open association and converts them to ACR/NEMA2/SPI.

After the association closed by the sender DRCV initiates the transfer of the images via PACSnet to the remote PACSnet node. If the folder transfer fails the whole folder will be sent again (retry) after a configurable time period. If that transfer also fails the folder will remain on the DICOM Gateway with status Aborted.

DRCV provides 8 DICOM AEs, one for each PACSnet node configured and. Depending on to which AE of DRCV the DICOM images are sent they are forwarded after conversion to the corresponding PACSnet node.

2.1.3.2.2 Proposed Presentation Contexts

The Siemens MagicServe / MagicLink D will accept Presentation Contexts as shown in the following tables.

Table 3: Send SCP Presentation Contexts

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**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCP	None
CT Image Storage	1.2.840.10008.5.1.4.1.1.**2**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCP	None

US MF Image Storage Retired	1.2.840.10008.5.1.4.1.1.**3**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCP	None
US MF Image Storage	1.2.840.10008.5.1.4.1.1.**3.1**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCP	None
MR ImageStorage	1.2.840.10008.5.1.4.1.1.**4**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCP	None

Ultrasound Image Storage Retired	1.2.840.10008.5**.** 1.4.1.1.**6**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCP	None
Ultrasound Image Storage	1.2.840.10008.5**.** 1.4.1.1.**6.1**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCP	None
SC Image Storage	1.2.840.10008.5**.** 1.4.1.1.**7**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCP	None

NM Image Storage	1.2.840.10008.5**.** 1.4.1.1.**20**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCP	None
X-Ray Angio-graphic Image- Storage	1.2.840.10008.5**.** 1.4.1.1.**12.1**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCP	None
X-Ray Radiofluoro-scopic Image Storage	1.2.840.10008.5**.** 1.4.1.1.**12.2**	DICOM Implicit VR Little Endian Transfer Syntax, DICOM Explicit VR Big Endian Transfer Syntax, DICOM Explicit VR Little Endian Transfer Syntax JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 and 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)	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	SCP	None

2.1.3.2.3 SOP Specific Conformance Statement

The Siemens MagicServe / MagicLink D conforms to the Full Storage Service Class at Level 2. No Type 1, Type 2 or Type 3 attributes are discarded from the image. Even elements specified by tags not included in the DICOM standard will be kept.

In the event of a successful C-STORE operation, the image has been successfully stored.

The MagicServe / MagicLink D Receiver DRCV returns the status Success upon successful operation. Otherwise one of the following status codes is returned and the association is aborted:

- Refused (A700):
  This error status indicates a lack of Resources (e.g. not enough disk space) on the DICOM Interface Queues.
- Error (A900 or C000):
  An error occurred while processing the image. The image will not be stored and the association is aborted

3 Communication Profiles

3.1 Supported Communication Stacks

Siemens MagicServe / MagicLink D provides DICOM TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

3.1.1 OSI Stack

not yet supported.

3.1.2 TCP/IP Stack

Siemens MagicServe / MagicLink D uses the TCP/IP stack from the SUNOS 4.1.3U1 system upon which it executes.

3.1.2.1 Physical Media Support

Siemens MagicServe / MagicLink D is independent of the physical medium over which TCP/IP executes. This feature is inherent in the SUN operating system used.

3.1.3 Point-to-Point Stack

not supported.

4 Extensions/Privatizations/ Specializations

4.1 Standard Extended/ Specialized/Private SOPs

None.

4.2 Private Transfer Syntaxes

None.

5 Configuration

5.1 AE Title / Presentation Address Mapping

The Siemens DICOM Gateway maps Application Entity Titles to host name and port number via an internal configuration method. The IP address for the host name is determined using standard Unix system calls.

For each DICOM Gateway unique Application Entity Titles are assigned using the following mechanism:

Each Application Entity Title starts with a unique 10 character string assigned for this DICOM Gateway node. This string is also used as the first 10 characters of each PACSnet Logical Address (PLA) of the SIENET processes on the DICOM Gateway. An example for such a string is '049SA1OT39'.

The DICOM Application DRCV uses the Port number 50082 and provides up to 8 DICOM Application Entity Titles, one for each PACSnet node accessible via the DICOM Gateway. If <AEroot> describes this 10 character unique string assigned to this specific DICOM Gateway, the DICOM Application Entity titles of DRCV are:

- ❏ <AEroot>DIC1
- ❏ <AEroot>DIC2
- ❏ <AEroot>DIC3
- ❏ <AEroot>DIC4
- ❏ <AEroot>DIC5
- ❏ <AEroot>DIC6
- ❏ <AEroot>DIC7
- ❏ <AEroot>DIC8

The DICOM Sender Application DFOS provides the Application Entity Title for both Storage and Verification:

❏ <AEroot>DFOS

The PACSnet Logical Addresses of the SIENET processes of the DICOM Gateway are assigned in a similar way.

There are up to 8 PACSnet Receiver processes RCV2 to RCV9, one for each DICOM destination accessible via the DICOM Gateway:

❏ <AEroot>RCV2 port 50072

❏ <AEroot>RCV3 port 50073

❏ <AEroot>RCV4 port 50074

❏ <AEroot>RCV5 port 50075

❏ <AEroot>RCV6 port 50076

❏ <AEroot>RCV7 port 50077

❏ <AEroot>RCV8 port 50078

❏ <AEroot>RCV9 port 50079

If the DICOM Gateway runs on separate hardware, an additional PACSnet Receiver Process RCV0 is started on the DICOM Gateway for compatibility reasons with current Siemens products.

❏ <AEroot>RCV0port 50026

Images sent to this PACSnet Receiver are forwarded to the same DICOM destination as those sent to PACSnet Receiver RCV2 (PLA <AEroot>RCV2) on the DICOM Gateway.

5.2 Configurable Parameters

❏ The Application Entity Titles, host names and port numbers.

❏ max PDU size set to 16384 Bytes (16 kB)

- ❏ time-out for accepting/rejecting an association request: 90sec
- ❏ time-out for responding to an association open/close request: 90sec
- ❏ time-out for accepting a message over the network: 90sec
- ❏ number of DFOS childs(1-50)
- ❏ activate/deactivate discarding shadow groups when sending to DICOM

6 Support of Extended Character Sets

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

Appendix: Requirements for DICOM Images imported into SIENET

Scope

Siemens MED had implementations of the ACR-NEMA Image Format with the SPI extensions in products in the field since 1987.

While a DICOM Conformance Statement very well describes the behavior of an Imaging Modality as an acquisition device or Service Class User, the Conformance Statement seems not to suite too well for Service Class Providers as a Workstation.

A workstation might need other than Type 1 attributes of a given object in order to perform certain functions. Therefore SCP Conformance to a Standard SOP Class does not necessarily mean, that all functions, the device implemented, can be performed on a given object.

The user is responsible for validation and assurance of interoperability.

This section of the MagicServe / MagicLink D Conformance Statement document defines requirements for the classification of image formats of different classes of application (Categorizing of Object Attributes for Specific Applications R1.0 03-July-1996):

- ***Management*** (Management and Organization reflects to Data which allows correct and unique Identification of images in order to keep a reliable and consistent database for the images).
- ***Display*** (pixel and pixel oriented graphics, e.g. ROI data can be displayed).
- ***Simple evaluation*** (e.g. density measurement).

- ***Reporting*** from a softcopy device. Image text including patient, examination and measurement data can be displayed, correct sorting of the images is supported. The image (pixels and text) should appear the same as it did on the originating modality. Lay-out and Fonts may be different from the originating modality.
- ***Reporting*** from a hardcopy device (Film Printing). Same requirements as softcopy reporting.
- ***Complex evaluation***, e.g. 3D, MPR.

Object Attribute Categories have been defined for these applications with the main purpose:

- ❏ Define a list of mandatory data elements for the producer of images.
- ❏ Provide a prerequisite for networking projects more effectively without frustrating the user with incorrect assumptions.

Categorizing of Object Attributes for Specific Applications

DICOM specifies composite image object definitions by a decomposition of the data elements (attributes) into modules. This decomposition was driven by the DICOM data model.

The Siemens defined Application Categories define modules from their functionality. Siemens PACS workstations require certain attributes in an image data objects in order to perform certain functions.

Basically most of this is achieved by DICOM, but there still is the problem, that certain elements are not mandatory in the DICOM information object definitions.

A correct DICOM object is specified for different object types in part 3 of the DICOM standard. The required elements for a correct DICOM object can be found in part 3.

The Definitions of the Application Categories simply re-assign the type for the elements. DICOM defined Type 2 and 3 elements are classified as required elements for Siemens implementations because of their importance to achieve a functionality in SIENET and other Siemens products.

We expect these attributes to be present in the image data object with correct values in order to enable a clinically relevant operation of the department.

In order to have a smooth operation of the MagicView, the image data objects should be compliant to the following table.

Table 4:

Tag	Name	Definition
(0008,0020)	Study Date	The Date on which the study started.
(0008,0030)	Study Time	The time the study started.
(0008,0060)	Modality	Source Equipment for the images. Values are e.g.: CT, MR, CR. Usage: Select Folders (Images) by their modality).
(0008,0080)	Institution ID	Institution at which the digital image originated. *Usage: Text on films, which are exported.*
(0010,0010)	Patient Name	
(0010,0020)	Patient ID	Primary hospital identification number or code for the patient.
(0010,0030)	Patient Birthday	
(0010,0040)	Patient Sex	Enumerated values: M,F,O
(0020,0010)	Study	Study Identification.
(0020,0011)	Series	Series Number.
(0020,0012)	Acquisition	Acquisition Number. Modality-assigned.
(0020,0013)	Image	Image Number. Modality-assigned.

Note: Emergency-Cases can fit into this scheme (e.g. a Patient-ID is specific for emergency exams). These images can be modified later by the image management system.

Requirements for Display and Simple Evaluation

- ❏ 0028/0002 Samples per Pixel must have a value of 1 or 3.
- ❏ 0028/0004 Photometric Interpretation must have a value of Monochrome1, Monochrome2,Palette Color if 0028/0002 has the value 1
- ❏ 0028/004 must have a value of RGB, if 0028/0002 has value 3
- ❏ 0028/0100 Bits Allocated must be 8 or 16(decimal)
- ❏ at least one of 0028/0101 and 0028/0102 must have a value.
- ❏ 0028/0102 High Bit must have the value of Bits Stored minus 1 (right bounded).
- ❏ 0028/1050,0028/1051,0028/1052,0028/1053 must have values, which allow the image to be displayed on another station.
- ❏ Bits of the pixel data, which are not described by groups 0028 and 60xx (00<=xx<=1e) must be set to 0.
- ❏ if 0028/0008 number of frames has a value, it must be 1

These are the requirements for Display and Simple Evaluations of SIENET workstations. The Storage of images do not follow the current restrictions.