

SIENET MagicStore VB22E

HS

DICOM Conformance Statement

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

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0 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 the Siemens implementation of a Medical Imaging Storage and Archive System (SIENET MagicStore) running Software Version VB22D.

The SIENET MagicStore DICOM Interface acts as a service class provider (SCP) for Storage, Storage Commitment, Verification, Query/Retrieve and Worklist Service Class. The SIENET Magic-Store DICOM Interface acts as a service class user (SCU) for Storage Service Class.

0.2 Definitions, Acronyms and Abbreviations

ACR	A merican C ollege of R adiology
AE	DICOM A pplication E ntity
API	A pplication P rogrammers I nterface
DNES	DICOM N - E vent S erver
DPQR	DICOM (P atient D irectory) Q uery
DQRY	DICOM Q uery P rovider
DRCV	DICOM R eceiver
Folder	Siemens specific name for a set of (ACR-NEMA/SPI) images, corresponds to a DICOM Study Component
FOS	F older S ender
IOD	DICOM I nformation O bject D efinition
NEMA	N ational E lectrical M anufacturers A ssociation
PACSnet	Siemens proprietary implementation of the SPI Standard
PDU	P rotocol D ata U nit
PLA	P acsnet L ogical A ddress (to identify an application on a PACSnet node)
RIS	R adiology I nformation S ystem
SAS	Siemens A bteilungsmanagement S ystem
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 I Dentifier, string unique in the whole network

0.3 References

- [1] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-14

1 Implementation Model

Siemens MagicStore DICOM Interface is implemented to support four DICOM Application Entities (AE) as SCP which receive associations (Verification, Storage, Storage Commitment, Query/Retrieve, Work-list) from remote Application Entities.

Siemens MagicStore DICOM Interface originates associations for Storage of DICOM Composite Information Objects as SCU in Remote Application Entities.

The MagicStore consists of two Database Services:

- o An Image Management and Storage Service, which holds information about patients and images for the patients currently active.
This Service includes a provider for the DICOM Storage, the DICOM Storage Commitment and the Query/Retrieve Service Class as well as a user for DICOM Storage.
- o A Magic Management Service, which has knowledge about all folders of all patients. The Magic Management Service is a Long Term Database Service, which controls folders on both on-line and archive media. The long term database can serve one or multiple Image Management and Storage Servers. This Service only supports a provider for the DICOM Query/Retrieve Service Classes. The images can be located on any Image Management and Storage Server.
If the Magic Management Service is connected to a SAS or some other RIS it can also manage the information about scheduled imaging procedures.

The Siemens MagicStore does not support the Media Storage Service Class.

1.1 Application Data Flow Diagram

The two Database Services may be located on different servers. Therefore the application data flow is different.

1.1.1 Image Management and Archive Server

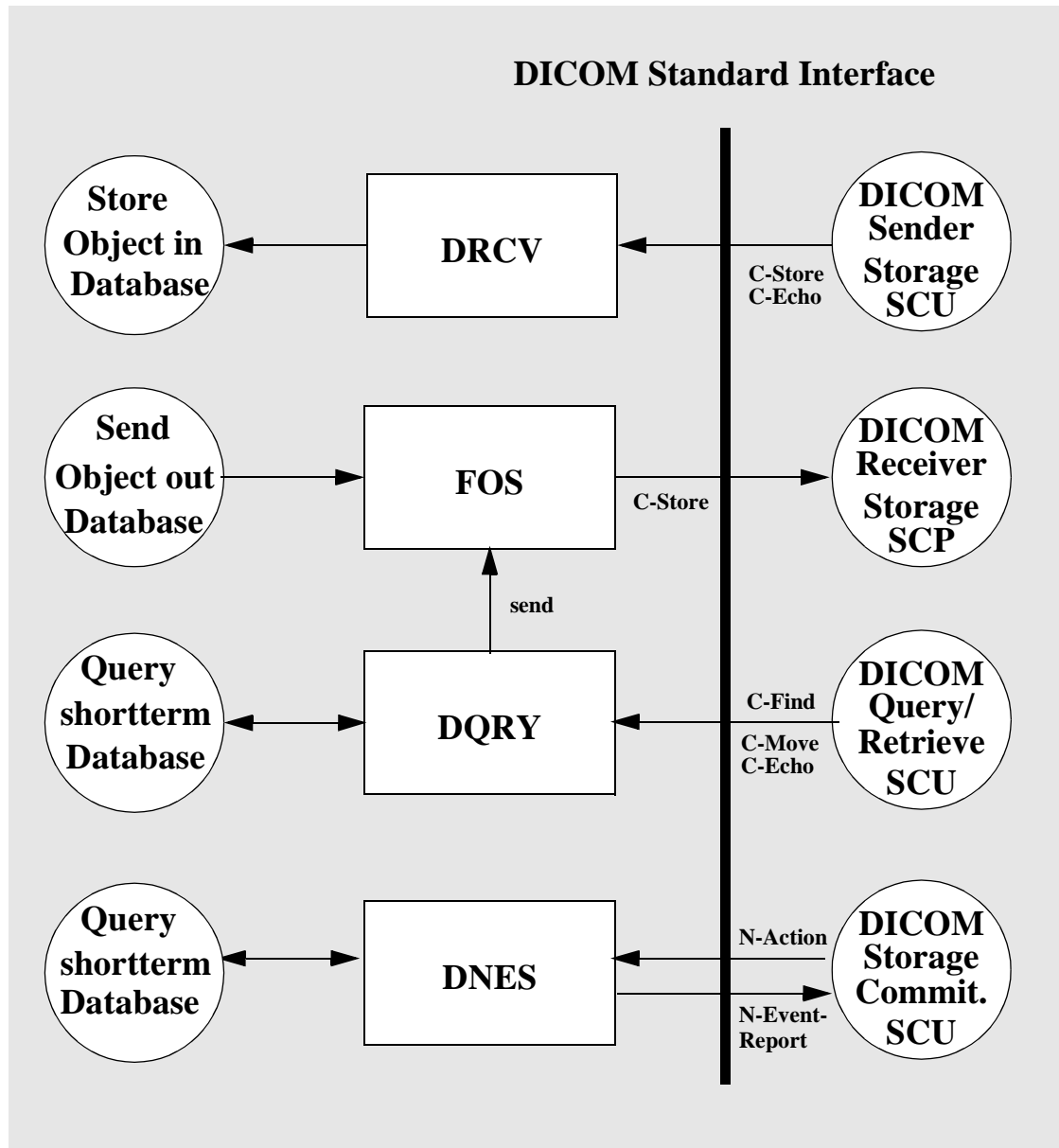
DRCV (DICOM Receiver for DICOM Image Storage), FOS (Folder Sender for Image Storage), DNES (DICOM N-Event Server) and DQRY (DICOM Query/ Retrieve Provider) are applications to handle the DICOM communication for SIENET MagicStore.

These applications are started automatically and will be invoked automatically via network or via the integrated SIENET MagicStore user-interface.

- o A remote Application Entity (AE) initiates an association for the DICOM Storage Service Class to the AE of DRCV. Upon acceptance of the association by DRCV the remote AE transmits the DICOM Information Objects to DRCV. After an object is received, DRCV initiates the transfer of the DICOM objects to the MagicStore image database. The images remain on short term storage before they are moved into the long-term archive.
- o A remote Application Entity (AE) initiates an association for the DICOM Storage Commitment Service Class to the AE of DNES. Upon acceptance of the association by DNES the remote AE transmits the DICOM Storage Commitment request. DNES queries the short term database for the existence of the referenced SOP Instances and returns a success status in case all SOP Instances have been successfully stored. This will be done via the same or a new association.

- o FOS 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.
- o A remote Application Entity (AE) initiates an association for the DICOM Query/Retrieve Service Class to the AE of DQRY. Upon acceptance of the association by DQRY the remote AE transmits DICOM Query/Retrieve Requests to DQRY.
 - In case of a C-Find Request the DQRY queries the short term image database of MagicStore and generates a response for each match. The responses are sent back to the remote AE via DICOM Query Responses.
 - In case of a C-Move Request the DQRY queries the short term image database of MagicStore and initiates a Storage Request for each match. A final Retrieve response is sent back to the remote AE.

Figure 1: Image Storage and Archive Server Application Data Flow Diagram



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1.1.2 Magic Management Database Server

The application DPQR is a Query/Retrieve and Worklist Service Class Provider.

This application is started automatically and will be invoked automatically via network or via the integrated SIENET MagicStore user-interface.

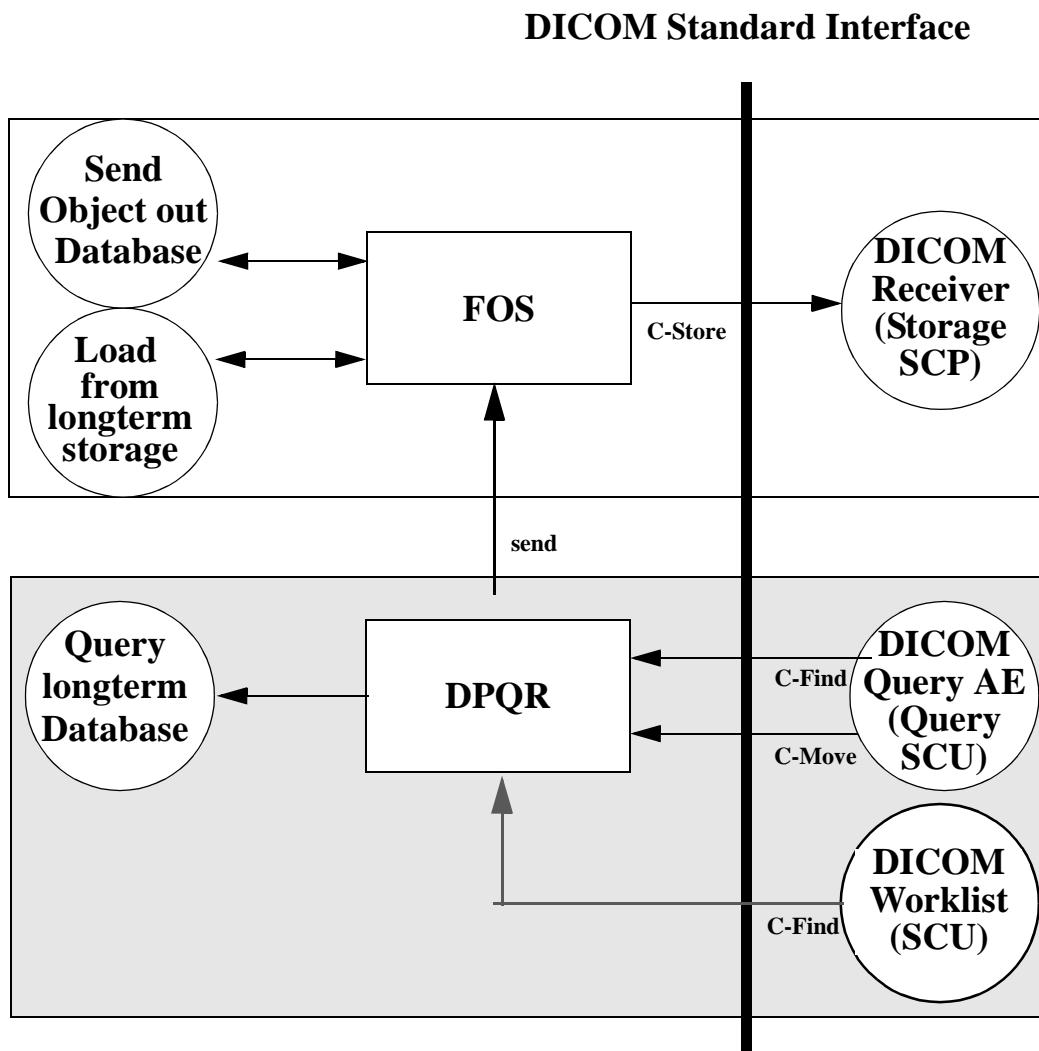
A remote Application Entity (AE) initiates an association for the DICOM Query/Retrieve or Worklist Service Class to the AE of DPQR.

Upon acceptance of the association by DPQR the remote AE transmits DICOM Query/Retrieve or Worklist Requests to DPQR.

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- o In case of a C-Find Request the DPQR queries the long term database of MagicStore and generates a response for each match. The responses are sent back to the remote AE via DICOM Query Responses.
 - DPQR’s response contains in case of the Query/Retrieve Service the Retrieve AE Title Data Element, whose value can either be a DQRY AE Title of any SIENET MagicStore in the network or the DPQR AE Title of that SIENET MagicStore, where DPQR is installed. There can be multiple AE’s of DQRY in one network, there can only be one AE of DPQR in one network.
 - In case of a worklist request the response of DPQR only contains the requested attributes.
- o In case of a C-Move Request the DPQR queries the long term image database of MagicStore and initiates a Storage Request for each match. This Storage Request may be executed by any SIENET MagicStore in the network, depending where the images to be reloaded from long term media are located. A final Retrieve response is sent back to the remote AE.

Figure 2: Magic Management Database Server Application Data Flow Diagram



1.2 Functional Definitions of Application Entities

All components of the Siemens DICOM Interface (including DRCV, DNES, FOS, DQRY/DPQR) 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 Title and the Port Number the SCP is listening on are taken from the local configuration.

DNES acting as a SCP is waiting for Storage Commitment requests from a remote DICOM Application Entity. As a result DNES sends a N-Event-Report about success or failure to the Application Entity that issued the Storage Commitment request.

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

DQRY/DPQR acting as a SCP are waiting for association requests from a remote DICOM client. The Application Entity Title and the Port Number the SCP is listening to are taken from the local configuration.

1.3 Sequencing of Real World Activities

The Archive Server with Magic SAS is a RIS that is capable of scheduling Studies and Procedure Steps. This information is provided to modalities by the use of DICOM Modality Worklist SCP service class. In case the Magic Store is connected to a RIS through a MagicLink I it receives the worklist in a Siemens proprietary form but it still serves as a DICOM Modality Worklist SCP.

After sending images to the Image Storage and Archive Server, the images can be retrieved from both the Image Storage and Archive Server and the Magic Management Database Server. If the archive media is offline (CD or OD), a message for the operator will be created indicating to insert the corresponding media.

2 Application Entity Specifications

Each process of the application "Image Storage and Archive Server" on SIENET MagicStore provides one Application Entity. There are Application entities of FOS, DRCV, DNES, DPQR and DQRY.

The Siemens MagicStore provides Standard Conformance to the following DICOM Storage SOP Classes as an SCU and SCP:

Storage SOP Classes as an SCU and SCP

- o CR (Computed Radiography) Image Storage
- o CT Image Storage
- o Ultrasound Multi-frame Image Storage
- o Ultrasound Multi-frame Image Storage - Retired
- o Ultrasound Image Storage
- o Ultrasound Image Storage - Retired
- o MR Image Storage
- o SC Image Storage
- o NM Image Storage
- o X-Ray Radiofluoroscopic Image Storage
- o X-Ray Angiographic Image Storage
- o RT Image Storage
- o PET Image Storage
- o Standalone PET Curve Storage
- o Digital X-Ray Image Storage for Presentation
- o Digital X-Ray Image Storage for Processing
- o Digital Mammography Image Storage for Presentation
- o Digital Mammography Image Storage for Processing
- o Digital Intra-Oral Image Storage for Presentation

The Siemens MagicStore provides Standard Conformance to the following DICOM Query/Retrieve SOP Classes as an SCP:

Query/Retrieve SOP Classes as an SCP

- o Patient Root Query/Retrieve Information Model - FIND
- o Patient Root Query/Retrieve Information Model - MOVE
- o Study Root Query/Retrieve Information Model - FIND
- o Study Root Query/Retrieve Information Model - MOVE

- o Patient/Study Only Query/Retrieve Information Model - FIND
- o Patient/Study Only Query/Retrieve Information Model - MOVE
- o Modality Worklist Information Model - FIND

The Siemens MagicStore provides Standard Conformance to the following DICOM Verification SOP Class as an SCP:

Verification SOP Classes as an SCP

- o Verification

The Siemens MagicStore provides Standard Conformance to the following DICOM Storage Commitment SOP Class as an SCP:

Storage Commitment SOP Class as an SCP

- o Storage Commitment Push Model

2.1 Association Establishment Policies

2.1.1 General

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

2.1.2 Number of Associations

FOS initiates several associations at a time, one for each transfer request being processed. By default (see section 5.2 on page 41) there may be up to 5 concurrent associations initiated by FOS active at a time, which are processed in parallel.

DRCV, DQRY and DNES, respectively DPQR, accept multiple associations from different remote DICOM AEs at a time (max default 10). There may be several concurrent associations active and processed in parallel.

2.1.3 Asynchronous Nature

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

2.1.4 Implementation Identifying Information

The Siemens MagicStore provides an Implementation Class UID of

o "1.3.12.2.1107.5.8"

and an Implementation Version Name of "SNKIT_1.10"

2.2 Association Initiation Policy

The Siemens MagicStore attempts to initiate a new association for

o DIMSE-C-STORE

o DIMSE-N-Event-Report

service operations.

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

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

The associated Real-World activity is a C-Store request initiated by the user of the workstation or by internal daemon processes. If FOS successfully establishes an association to a remote Application Entity, it will normalize to DICOM format and transfer each image of the 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. After a configurable time period (see 5.2) the transfer of the folder is started again. If the Retry (3 times) also fails, the foldername will be logged on a history queue with status Failed.

The DICOM targets are configured at configuration time.

2.2.1.2 Proposed Presentation Contexts

The Siemens MagicStore will propose Presentation Contexts as shown in the following tables.

Table 1: Send SCU Presentation Contexts of MagicStore

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 und 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
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	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 und 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
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	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 und 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

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Digital Mammography Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.2	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 und 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
Digital Mammography Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.2.1	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 und 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
Digital Intra-Oral X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.3	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 und 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 Extended (Process 2 und 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	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 JPEG Baseline (Process 1) Lossy JPEG Extended (Process 2 und 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	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 und 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 Extended (Process 2 und 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	SCU	None
US 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 und 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

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US 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 und 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 und 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 und 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 und 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

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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 und 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
Stand-alone PET Curve Storage	1.2.840.10008.5.1.4.1.1. 129	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 und 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
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1. 128	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 und 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
RT Image Storage	1.2.840.10008.5.1.4.1.1. 481.1	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 und 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

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2.2.1.3 SOP Specific Conformance Statement

The DICOM images sent by the Siemens MagicStore conform to the DICOM IOD definitions (Standard extended IODs).

MagicStore transparently stores DICOM objects, which it receives. MagicStore is not responsible for the content of the objects.

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!

Sending different folders will open a new association for each folder.

Only if the following statements are true an Internal Data Set Object can be altered with JPEG Lossless Compression:

- o Photometric Interpretation (0028,0004) is MONOCHROME1 or MONOCHROME2 (means a gray scale image)
- o Bits Allocated (0028,0100) is 16 or 8
- o Bits Stored (0028,0101) is 16,12,10 or 8
- o High Bit (0028,0102) is Bits Stored (0028,0101)-1
- o Pixel Data (7FE0,0010) exists and matrix is not already compressed

Only if the following statements are true an Internal Data Set Object can be altered with JPEG Lossy Compression:

- o Photometric Interpretation (0028,0004) is MONOCHROME1, MONOCHROME2 (means a gray scale image) or RGB
- o Bits Allocated (0028,0100) is 16 or 8 for MONOCHROME1 and MONOCHROME2 or 8 for RGB
- o Bits Stored (0028,0101) is 12,10 or 8 for MONOCHROME1 and MONOCHROME2 or 8 for RGB
- o High Bit (0028,0102) is Bits Stored (0028,0101)-1 for MONOCHROME1 and MONOCHROME2 or 7 for RGB
- o Pixel Data (7FE0,0010) exists and matrix is not already compressed

2.3 Association Acceptance Policy

The Siemens MagicStore accepts a new association for

- o DIMSE-C-Echo
 - o DIMSE-C-Store
 - o DIMSE-C-Find
 - o DIMSE-C-Move
 - o DIMSE-N-Action
- service operations.

2.3.1 Real-World Activity - Receive Echo

2.3.1.1 Associated Real-World Activity - respond to echo request

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

2.3.1.2 Accepted Presentation Contexts

The Siemens MagicStore will accept Presentation Contexts as shown in the following table.

Table 2: Echo SCP Presentation Contexts of MagicStore

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ex- tended Negoti- ation
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,	1.2.840.10008.1.2.1		
		DICOM Explicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2.2		

2.3.1.3 SOP Specific Conformance to the Verification SOP Class

The DICOM MagicStore provides standard conformance to the DICOM Verification Service Class and accepts any Application Entity Title from the SCU.

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

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

The associated Real-World activity is a C-Store request received by the daemon process DRCV. After accepting an association from a remote DICOM AE, the DRCV process receives the images via the open association.

After the association is closed by the sender, DRCV initiates the transfer of the images information into the MagicStore's database.

2.3.2.2 Accepted Presentation Contexts

The Siemens MagicStore will accept Presentation Contexts as shown in the following tables.

Table 3: Send SCP Presentation Contexts of MagicStore

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 und 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
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	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 und 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
Digital X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.1.1.1	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 und 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

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<p>Digital Mammography Image Storage - For Presentation</p>	<p>1.2.840.10008.5. 1.4.1.1.1.2</p>	<p>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 und 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)</p>	<p>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</p>	<p>SCP</p>	<p>None</p>
<p>Digital Mammography Image Storage - For Processing</p>	<p>1.2.840.10008.5. 1.4.1.1.1.2.1</p>	<p>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 und 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)</p>	<p>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</p>	<p>SCP</p>	<p>None</p>
<p>Digital Intra-Oral X-Ray Image Storage - For Presentation</p>	<p>1.2.840.10008.5. 1.4.1.1.1.3</p>	<p>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 und 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)</p>	<p>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</p>	<p>SCP</p>	<p>None</p>
<p>CT Image Storage</p>	<p>1.2.840.10008.5. 1.4.1.1.2</p>	<p>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 und 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)</p>	<p>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</p>	<p>SCP</p>	<p>None</p>

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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 und 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 und 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 und 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
US 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 und 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

<p>US Image Storage</p>	<p>1.2.840.10008.5.1.4.1.1.6.1</p>	<p>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 und 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)</p>	<p>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</p>	<p>SCP</p>	<p>None</p>
<p>SC Image Storage</p>	<p>1.2.840.10008.5.1.4.1.1.7</p>	<p>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 und 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)</p>	<p>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</p>	<p>SCP</p>	<p>None</p>
<p>NM Image Storage</p>	<p>1.2.840.10008.5.1.4.1.1.20</p>	<p>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 und 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)</p>	<p>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</p>	<p>SCP</p>	<p>None</p>
<p>X-Ray Angio-graphic Image Storage</p>	<p>1.2.840.10008.5.1.4.1.1.12.1</p>	<p>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 und 4) Lossy JPEG Lossless, Non-Hierarchical (Process 14)</p>	<p>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</p>	<p>SCP</p>	<p>None</p>

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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 und 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
Stand-alone PET Curve Storage	1.2.840.10008.5.1.4.1.1. 129	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 und 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
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1. 128	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 und 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
RT Image Storage	1.2.840.10008.5.1.4.1.1. 481.1	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 und 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

2.3.2.3 SOP Specific Conformance Statement

The Siemens MagicStore 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.

The current implementation does not discard elements. In the event of a successful C-STORE operation, the image has been successfully stored.

Images with identical Study Instance UID sent in one association or images with identical Study Instance UID sent in more associations within a configurable time (default time is 0) are grouped into one folder. Images received after time expired are assigned a new folder identification.

The MagicStore can be configured (see 5.2) to save the patient name in a normalized format, e.g. the used RIS format. The original name is saved in the private tag (0095,0020).

If patient demographics or image information are modified later on, the original header could be modified and private elements might be discarded in order to prevent inconsistencies in elements not known to us.

Only if the following statements are true a Data Set Object with JPEG Lossless Compression can be received:

- o Photometric Interpretation (0028,0004) is MONOCHROME1 or MONOCHROME2 (means a gray scale image)
- o Bits Allocated (0028,0100) is 16 or 8
- o Bits Stored (0028,0101) is 16,12,10 or 8
- o High Bit (0028,0102) is Bits Stored (0028,0101)-1

Only if the following statements are true a Data Set Object with JPEG Lossy Compression can be received:

- o Photometric Interpretation (0028,0004) is MONOCHROME1, MONOCHROME2 (means a gray scale image) or RGB
- o Bits Allocated (0028,0100) is 16 or 8 for MONOCHROME1 and MONOCHROME2 or 8 for RGB
- o Bits Stored (0028,0101) is 12,10 or 8 for MONOCHROME1 and MONOCHROME2 or 8 for RGB
- o High Bit (0028,0102) is Bits Stored (0028,0101)-1 for MONOCHROME1 and MONOCHROME2 or 7 for RGB

The DICOM MagicStore Receiver DRCV returns the status Success upon successful operation. Otherwise one of the following status codes is returned and the association is aborted:

- o Refused (A700):
This error status indicates a lack of Resources (e.g. not enough disk space) on the DICOM Interface Queues.
- o Error (A900 or C000):
An error occurred while processing the image. The image might not be stored and the association is aborted.
- o Success (0000)
The C-Store operation has been completed successfully.

2.3.3 Real-World Activity - Receive Query Request from a remote Node

2.3.3.1 Associated Real-World Activity - respond to find request

- o Image Storage and Archive Server
 - The associated Real-World activity is a C-Find request received by the daemon process DQRY. After accepting an association from a remote DICOM AE, the DQRY process receives the query requests via the open association and queries the short-term database. For each match a result message is sent to the requesting remote node.
- o Magic Management Database Server
 - The associated Real-World activity is a C-Find request received by the daemon process DPQR. After accepting an association from a remote DICOM AE, the DPQR process receives the query requests via the open association and queries the long-term database. For each match a result message is sent to the requesting remote node.

2.3.3.2 Accepted Presentation Contexts

The Siemens MagicStore will accept Presentation Contexts as shown in the following table.

Table 4: Query SCP Presentation Contexts of MagicStore

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ex- tended Negoti- ation
Name	UID	Name List	UID List		
Patient Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1. 4.1.2.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	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		
Study Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1. 4.1.2.2.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	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		
Patient/Study Only Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1. 4.1.2.3.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	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		

Modality Worklist- Information Model - FIND	1.2.840.10008.5.1. 4.31	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	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		

2.3.3.3 SOP Specific Conformance Statement

- o Relational Queries are supported.
- o Priority processing is not supported.
- o The query matching for patient name is case sensitiv.
(Can be configured to case insensitiv, see 5.2)
- o The DICOM MagicStore Query Provider DQRY/DPQR returns one of the following status codes:
 - Success (0000):
Matching is complete
 - Pending (FF00):
Matches are continuing.
 - Pending (FF01):
Matches are continuing.Warning that one or more Optional Keys were not supported for existence for this Identifier.
 - Failed (A900):
Identifier does not match SOP Class
 - Refused (A700):
Out of Resources (0000,0902) Matchoverflow(default limit 500 matches)
 - Failed (C001)
Unable to process (special (0000,0902) no license)
 - Cancel (FE00)
- o The DQRY only returns the own AET as Retrieve AET.
- o The Storage Media File-Set ID (0088,0130) is used for the folder_status information ("INSTORE").
(Not used, if the Query/Retrieve Level is Patient.)

additional SOP Specific Conformance Statements for the Magic Management Database Server:

- o The DPQR returns the own AET as Retrieve AET and additional the AET of the DQRY of the Image Archive and Storage Server, where the images are located, if they are in store.
- o The Patient Root and Study Root Query/Retrieve Model only work with retrieve level patient or study. Although this is not DICOM conform, the Magic Management Database Server supports these Services, because many Dicom Query Retrieve users did not implement the Patient/Study Only Query Retrieve Model.
- o The Storage Media File-Set ID (0088,0130) is used for folder_status information ("INSTORE", "NEAR-LINE", "OFFLINE"). (Not used, if the Query/Retrieve Level is Patient.)

additional SOP Specific Conformance Statements for the Magic Management Database Server supporting the Modality Worklist Information Model:

- o Magic SAS or connected RIS systems are using a catalog for the requested location. The requested location is mapped to the AET of the SCU. If you configure a worklist SCU with the SIT tool, you have to set the component name to the name used by the server assigned to this modality.
- o A scheduled study will change its status, if images are arriving concerning the scheduled study. Matches will be performed based on accession number (0008,0050) and requested procedure id (0040,1001).

2.3.3.3.1 Patient Root C-Find SOP Class Specific Conformance Statement

R = required, U = unique, O = optional

Table 5: Supported Patient level attributes

Description	Tag	Type
Patient's Name	(0010,0010)	R
Patient ID	(0010,0020)	U
Patient's Birth Date	(0010,0030)	O
Patient's Sex	(0010,0040)	O
Other Patient IDs	(0010,1000)	O

Table 6: Supported Study level attributes

Description	Tag	Type
Study Date	(0008,0020)	R
Study Time	(0008,0030)	R
Accession Number	(0008,0050)	R
Study ID	(0020,0010)	R
Study Instance UID	(0020,000D)	U
Referring Physician's Name	(0008,0090)	O
Study Description	(0008,1030)	O
Name of Physician(s) Reading Study	(0008,1060)	O
Number of Study Related Images	(0020,1208)	O

Table 7: Supported Series level attributes

Description	Tag	Type
Modality	(0008,0060)	R

Description	Tag	Type
Series Number	(0020,0011)	R
Series Instance UID	(0020,000E)	U
Body Part Examined	(0018,0015)	O
Requested Procedure ID	(0040,1001)	O

The attribute Number of Series Related Instances (20,1209) is not supported. The Requested Procedure ID may or may not be part of the Request Attributes Sequence (40,275) in the C-Find request the Query/Retrieve Provider receives. In the C-Find response the Requested Procedure ID will be encoded in the Request Attributes Sequence.

Table 8: Supported Image level attributes

Description	Tag	Type
Image Number	(0020,0013)	R
SOP Instance UID	(0008,0018)	U
Image Date	(0008,0023)	O
Image Time	(0008,0033)	O

2.3.3.3.2 Study Root C-Find SOP Class Specific Conformance Statement

Table 9: Supported Study level attributes

Description	Tag	Type
Study Date	(0008,0020)	R
Study Time	(0008,0030)	R
Accession Number	(0008,0050)	R
Patient's Name	(0010,0010)	R
Patient ID	(0010,0020)	R
Study ID	(0020,0010)	R
Study Instance UID	(0020,000D)	U
Referring Physician's Name	(0008,0090)	O
Study Description	(0008,1030)	O
Name of Physician(s) Reading Study	(0008,1060)	O
Patient's Birth Date	(0010,0030)	O

Description	Tag	Type
Patient's Sex	(0010,0040)	O
Other Patient IDs	(0010,1000)	O
Number of Study Related Images	(0020,1208)	O

- o The same Series level attributes as in the Patient Root C-Find SOP class are supported.
- o The same Image level attributes as in the Patient Root C-Find SOP class are supported.

2.3.3.3 Patient/Study Only C-Find SOP Class Specific Conformance Statement

- o The same Patient level attributes as in the Patient Root C-Find SOP class are supported.
- o The same Study level attributes as in the Patient Root C-Find SOP class are supported.

2.3.3.4 Modality Worklist C-Find SOP Class Specific Conformance Statement

The following table shows the supported attributes. The last column indicates, that some attributes are not supported, if there is no MagicSAS.

Table 10: Worklist attributes

Attribute Name	DICOM Tag	supported Matching	without MagicSAS
Scheduled Procedure Step Sequence	(0040,0100)	Sequence Matching	
>Scheduled Station AE Title	(0040,0001)	Single Value	
>ScheduleId Procedure Step Start Date	(0040,0002)	Single Value, Range	
>ScheduleId Procedure Step Start Time	(0040,003)	Single Value, Range	
>Modality	(0008,0060)	Single Value	
>Scheduled Procedure Step Description	(0040,0007)	Wild Card Single Value	
>Scheduled Station Name	(0040,0010)	Wild Card Single Value	
>Scheduled Procedure Step Location	(0040,0011)	Wild Card Single Value	

Attribute Name	DICOM Tag	supported Matching	without MagicSAS
>Scheduled Procedure Step ID	(0040,0009)	Wild Card Single Value	
Requested Procedure ID	(0040,1001)	Wild Card Single Value	
Reason for study	(0032,1030)	Wild Card Single Value	
Requested Procedure Description	(0032,1060)	Range Matching	
Study Instance UID	(0020,00D)	Single Value	
Requested Procedure Priority	(0040,1003)	defined terms	not supported
Patient Transport Arrangements	(0040,1004)	Single Value	not supported
Requested Procedure Comments	(0040,1400)	Wild Card Single Value	not supported
Accession Number	(0008,0050)	Single Value	
Requesting Physician	(0032,1032)	Wild Card Single Value	not supported
Referring Physician's Name	(0008,0090)	Wild Card Single Value	
Current Patient Location	(0038,0300)	Wild Card Single Value	
Patient's Name	(0010,0010)	Wild Card Single Value	
Patient ID	(0010,0020)	Wild Card Single Value	
Patient Birth Date	(0010,0030)	Single Value, Ranging	
Patient's Sex	(0010,0040)	Single Value	
Special Needs	(0038,0050)	Wild Card Single Value	not supported

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2.3.4 Real-World Activity - Receive Transfer Request from a remote Node

2.3.4.1 Associated Real-World Activity - initiate image transfer

o Image Storage and Archive Server

- The associated Real-World activity is a C-Move request received by the internal daemon process DQRY. After accepting an association from a remote DICOM AE, the DQRY process receives the move request via the open association and queries the short-term database. The requested images are sent to the requested remote node.

o Magic Management Database Server

- The associated Real-World activity is a C-Move request received by the internal daemon process DPQR. After accepting an association from a remote DICOM AE, the DPQR process receives the move request via the open association and queries the long-term database. The DPQR sends a request to the Folder Sender of the corresponding Image Storage and Archive Server to send the requested images to the determined remote node.

2.3.4.2 Accepted Presentation Contexts

The Siemens MagicStore will accept Presentation Contexts as shown in the following table.

Table 11: Retrieve SCP Presentation Contexts of MagicStore

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ex- tended Negoti- ation
Name	UID	Name List	UID List		
Patient Root Query/ Retrieve Information Model - MOVE	1.2.840.10008.5.1. 4.1.2.1.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	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		
Study Root Query/ Retrieve Information Model - MOVE	1.2.840.10008.5.1. 4.1.2.2.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	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		
Patient/Study Only Query/ Retrieve Information Model - MOVE	1.2.840.10008.5.1. 4.1.2.3.2	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCP	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		

2.3.4.3 SOP Specific Conformance statement for SOP class C-Move

- o DQRY/DPQR initiates C-Store sub-operations using DICOM Implicit VR Little Endian Transfer Syntax.
- o Relational Retrieve is supported.
- o The DICOM MagicStore Query Provider DQRY/DPQR returns one of the following status codes:
 - Success (0000):
Sub-Operations completed successfully
 - Failed(A900):
Identifier does not match SOP Class
 - Warning(B000):
One or more failure
 - Failed(C001):
Unable to process
 - Cancel (FE00)
 - Pending (FF00):
FOS will retry sending the images later on. In this special case the C_MOVE association will be closed.
- o **additional SOP Specific Conformance statement for the Magic Management Database Server:**
 - The Patient Root and Study Root Query/Retrieve Model only work with retrieve level patient or study. Although this is not DICOM conform, the Magic Management Database Server supports these Services, because many Dicom Query Retrieve users did not implement the Patient/StudyOnly Query Retrieve Model.

2.3.5 Real-World Activity - Receive Storage Commitment Request from a Remote Node

2.3.5.1 Associated Real-World Activity - Response to Storage Commitment Request

The associated Real-World activity is a Storage Commitment request received by the internal daemon process DNES. After accepting an association from a remote DICOM Application Entity DNES waits for receiving Storage Commitment requests. DNES queries the internal short term database for the SOP Instances referenced by the Storage Commitment request. In case the SOP Instances have already been moved to the long term storage DNES will return a failure status to the requestor.

2.3.5.2 Accepted Presentation Contexts

The Siemens MagicStore will accept Presentation Contexts as shown in the following table.

Table 12: Storage Commitment Push Model SCP Presentation Contexts of MagicStore

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1.1	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		

2.3.5.3 SOP specific Conformance Statement for SOP Class Storage Commitment Push Model SCP

2.3.5.3.1 Operations

Upon receipt of the N-Action request DNES returns, via the N-Action response primitive, one of the following N-Action Response Status Codes applicable to the associated request.

Return Status Codes:

- processing failure (0900)
- success (0000)

A success status conveys that DNES has successfully received the request. A failure status conveys that DNES is not processing the request.

The attributes Referenced Study Component Sequence (0008,1111), Storage Media File Set ID (0088,0130) and Storage Media File Set UID (0088,0140) are not supported.

2.3.5.3.2 Notifications

After querying the database for the SOP Instances referenced by the Storage Commitment request, DNES generates an N-EVENT-REPORT request according to the result of the query. The N-EVENT-REPORT request includes the same Transaction UID as contained in the initiating N-Action request. Afterwards the Transaction UID is no longer valid.

Furthermore, the N-EVENT-REPORT request contains the Retrieve AE Title (0008,0054) that can be used by the Storage Commitment SCU to query and/or retrieve the SOP Instances referenced by the Storage Commitment request.

Per default DNES opens a new association for the N-EVENT-REPORT request. It can also be configured, though, that DNES tries to use the same association as the N-Action request and only opens a new association in case of failure (see 5.2).

The attributes Referenced Study Component Sequence (0008,1111), Storage Media File Set ID (0088,0130) and Storage Media File Set UID (0088,0140) are not supported in the N-EVENT-REPORT request.

2.3.6 Presentation Context Acceptance Criterion

The Siemens MagicStore will accept any number of verification or storage SOP classes that are listed above. There is no limit on the number of presentation contexts accepted. In the event that the Siemens MagicStore runs out of resources, it will reject the association request.

2.3.7 Transfer Syntax Selection Policies

The Siemens MagicStore currently supports the Implicit VR Little Endian, the Explicit VR Little Endian, Explicit VR Big Endian JPEG Baseline (Process 1) Lossy, JPEG Extended (Process 2 und 4) Lossy and JPEG Lossless, Non-Hierarchical (Process 14) transfer syntax (detailed description see presentation context tables).

The transfer syntax priority order for the Storage Class Provider is: JPEG Baseline (Process 1) Lossy, JPEG Extended (Process 2 and 4), JPEG Lossless, Explicit VR Big Endian, Explicit VR Little Endian and Implicit VR Little Endian.

The transfer syntax priority order for the Query/Retrieve Provider and the Storage Commitment Provider is: Explicit VR Big Endian, Explicit VR Little Endian and Implicit VR Little Endian.

By default the Service Class User will always propose Implicit VR Little Endian.

JPEG restrictions are listed in chapter 2.2.1.3 SOP Specific Conformance Statement.

3 Communication Profiles

3.1 Supported Communication Stacks

Siemens MagicStore 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 MagicStore uses the TCP/IP stack from the SUN SOLARIS system upon which it executes.

3.1.2.1 Physical Media Support

Siemens MagicStore is independent of the physical medium over which TCP/IP executes. This feature is inherent in the SUN SOLARIS operating system used on the MagicStore.

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 MagicStore 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 MagicStore **default** unique Application Entity Titles are assigned using the following mechanism:

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

If <AEroot> describes such a 10 character unique string assigned to this specific DICOM MagicStore, the DICOM Application Entity title of DRCV and FOS (Storage AE Title) is:

<AEroot>DRSP port number:50082

The DICOM Application Entity Title of DNES (Storage Commitment Provider) is:

<AEroot>DNES port number:60034

The DICOM Application Entity Title of the query and retrieve daemons are:

<AEroot>DQRY short-term database port number 50089

<AEroot>DPQR long-term database port number 50090

The Portnumber and AE Titles can be changed with the SIENET Install Tool.

5.2 Configurable Parameters

The Application Entity Titles, host names and port numbers are configurable values.

The following parameters can be configured with the SIENET Install Tool. The Install Tool also uses some default parameters:

- o max PDU size set to 28672 Bytes
- o no patient name normalization
- o time-out for accepting/rejecting an association request: 240 sec
- o time-out for responding to an association open/close request: 240 sec
- o time-out for accepting a message over the network: 240 sec
- o time-out for a network connect to be accepted: 15 sec
- o time-out for waiting for data between packets: 60 sec
- o number of folder send retries: 3
- o time between folder send retries: 10 min
- o folder merge timeout for DICOM receiver: 0 sec (each image is a new folder)
- o maximum number of parallel image transfers to the same DICOM node: 2
- o maximum total number of parallel image transfers: 5

Whether the matching of the patient's name is case-insensitive and whether the Storage Commitment SCP opens a new association for the N-EVENT-REPORT request must be configured according to the requirements of the specific project and cannot be configured with the SIENET Installation Tool.

6 Support of Extended Character Sets

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

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