

SIEMENS

FLUOROSPOT[®] Compact VB0xx



AX

DICOM Conformance Statement

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1. Introduction

1.1 Overview

The Conformance Statement describes the DICOM interface for the Siemens FLUOROSPOT® Compact VB0xx in terms of part 2 of [DICOM].

This introduction describes the application's implemented DICOM functionality in general terms.

1.2 Scope and Field

The Siemens product FLUOROSPOT® Compact is a Multipurpose System for digital R/F, Angiography and Interventional Procedures. The FLUOROSPOT® Compact is designed to be integrated into an environment of medical DICOM-based devices. FLUOROSPOT® Compact supports the storage of images utilizing the DICOM XRF IOD and SC IOD. Additionally, FLUOROSPOT® Compact is able to retrieve a Worklist from an Information System utilizing the DICOM "Basic Worklist Management Service Class". Finally, FLUOROSPOT® Compact is able to support the "Print Management Service Class" and the "Media Storage Service Class".

This DICOM Conformance Statement refers to SIEMENS Fluorospot Compact product only.

1.3 Audience

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

1.4 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:

1. The comparison of different conformance statements is the first step towards assessing interconnectivity between Siemens and non-Siemens equipment.
2. 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.
3. 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.

1.5 Definitions, Terms and Abbreviations

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

Additional Abbreviations are as follows:

AE	DICOM Application Entity
DICOM	Digital Imaging and Communications in Medicine
DIMSE	DICOM Message Service Element
FSC	File Set Creator
FSE	Field Service Engineer
FSR	File Set Reader
IOD	DICOM Information Object Definition
ISO	International Standard Organisation
NEMA	National Electrical Manufacturers Association
PDU	DICOM Protocol Data Unit
RWA	Real-World Activity
SCP	Service Class Provider
SCU	Service Class User

1.6 References

- [1] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.13, 1996
- [2] Digital Imaging and Communications in Medicine (DICOM) 3.0, NEMA PS 3.10-12, 1998

1.7 Connectivity and Interoperability

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

2 Image Storage

2.1 Implementation Model

2.1.1 Application Data Flow Diagram

Image Send is performed on the user's request for each study completed or for specific images selected. Upon request, an association will be initiated, selected images will be sent to the remote node and the association will be closed.

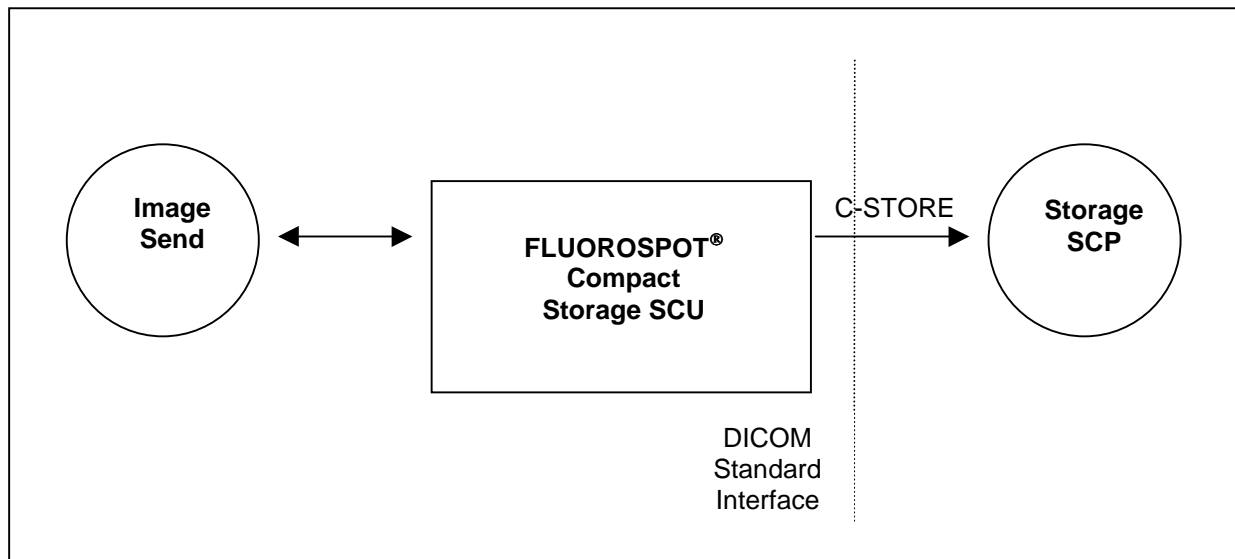


Figure 1: FLUOROSPOT® Compact DICOM Storage Implementation Model

2.1.2 Functional Definition "Image Send"

The FLUOROSPOT® Compact DICOM Application Entity acts as a Service Class User (SCU) for the

- Storage Service Class (to store images in a remote DICOM Node)

The Image Send Functionality is initiated through the user interface. The remote destination has to be defined during the configuration procedure as well as which kind of IOD (RF or SC) will be sent to each destination.

FLUOROSPOT® Compact will build a DICOM standard X-ray RF IOD or a SC IOD and initiates an association for all images selected.

If the association can not be opened, a notification to check for network problems will appear on the user interface. By default, FLUOROSPOT® Compact will not retry to initiate another association automatically. However, an automatic retry can be configured by a FSE.

During the transmission of images to the remote node, a status window will inform of the current transmission status.

2.1.3 Sequencing of Real-World Activities

not applicable

2.2 AE Specification

The FLUOROSPOT® Compact Application Entity provides Standard Conformance to the following DICOM SOP Classes as a SCU:

SOP Class Name	SOP Class UID
X-ray Radiofluoroscopy Image Storage	1.2.840.10008.5.1.4.1.1.12.2
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7

Table 1: Supported SOP Classes as SCU

2.2.1 Association Establishment Policies

2.2.1.1 General

Application Context Name (ACN)	1.2.840.10008.3.1.1.1
PDU maximum length	16 kB

Table 2: ACN and PDU

2.2.1.2 Number of Associations

FLUOROSPOT® Compact will attempt to initiate one association at a time.

2.2.1.3 Asynchronous Nature

Asynchronous communication, i.e. multiple outstanding transactions over a single association, is not supported. All transactions are done in a synchronous way, one by one.

2.2.1.4 Implementation Identifying Information

Implementation Class UID	1.3.12.2.1107.5.3.4
Implementation Version Name	Siemens_FLC_20

Table 3: Implementation Identifying Information

2.2.2 Association Initiation by Real-World Activity

FLUOROSPOT® Compact will attempt to initiate a new association for:

- DICOM Image Send (C-STORE)

2.2.2.1 Associated Real-World Activity

Image Send attempts to send an Image Object to a remote node. If the FLUOROSPOT® Compact AE establishes an association to a remote AE, it will transfer selected images via the open association. If the C-STORE response from the remote node contains a status "Error", the association is aborted. If the C-STORE response from the remote node contains a status "Success" or "Warning", the association is accepted. Image Send can be restarted at any time by user interaction.

The DICOM target nodes will be configured by a FSE.

2.2.2.2 Proposed Presentation Context (Presentation Context Table)

The DICOM Interface of the FLUOROSPOT® Compact will propose the following presentation contexts:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
SC Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM 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
RF Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.12.2	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM 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
Verification SOP Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM 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/ SCP	None

Table 4: Proposed Presentation Context

2.2.2.3 SOP specific Conformance Statement

The DICOM images created by the DICOM interface of the FLUOROSPOT® Compact conform to the DICOM XRF or SC IOD. Private elements and "retired" elements from earlier versions of the standard are not contained in the objects.

The FLUOROSPOT® Compact implements all mandatory modules and some user optional modules defined in the XRF or SC IOD module tables of the DICOM Standard (Tables A.16-1 and A.8-1 Part 3 of [1]). Within the modules all type 1 and type 2 attributes are supported.

The Fluorospot Compact does not support Multi-frame Images.

Please refer to Annex A for a complete listing of all supported DICOM elements.

2.2.3 Association Acceptance Policy

not applicable

2.3 Communication Profiles

2.3.1 Supported Communication Stacks (part 8)

The DICOM Interface of the FLUOROSPOT® Compact provides DICOM TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

2.3.2 TCP/IP Stack

The DICOM Interface of the FLUOROSPOT® Compact uses the TCP/IP stack from the Windows NT 4.0 (Service Pack 4.0) Operating system upon which it executes.

2.3.3 Physical Media Support

The DICOM Interface of the FLUOROSPOT® Compact is indifferent to the physical medium over which TCP/IP executes.

2.4 Extensions/Specializations/Privatizations**2.4.1 Standard Extended Secondary Capture Image Storage**

Current Patient Location (0038,0300) is included as an extension.

2.4.2 Standard Extended X-ray Radiofluoroscopy Image Storage

Current Patient Location (0038,0300) is included as an extension.

2.4.3 Private Transfer Syntaxes

None

2.5 Configuration

2.5.1 AE Title/Presentation Address Mapping

The Application Entity Title, Host name and Port number are defined via the configuration service. This configuration service is intended to be used by a FSE only.

2.5.2 Configurable Parameters

The Application Entity Titles, Host names and Port numbers are configured using the configuration service.

The type of IODs (XRF or SC) to be sent to the remote AE is also configured with configuration service.

Other configurable default values are described in 2.5.2.2 and 2.5.2.3.

2.5.2.1 Number of Simultaneous Associations

FLUOROSPOT® Compact supports for one service only one association at a time.

2.5.2.2 Maximum PDU Size

- max PDU size: 16 kB

2.5.2.3 Time Out

- time-out until a SCP has to accept/reject an association request: 15 sec
- time-out for accepting a message over network: 30 sec

2.6 Support of Extended Character Sets

ISO-IR 100 (ISO 8859-1:1987 Latin Alphabet N 1. supplementary set)
ISO-IR 144 (ISO 8859-5:1988 Latin/Cyrillic Alphabet supplementary set)

If the FLUOROSPOT® Compact is configured for cyrillic character set support, ISO-IR 144 will be used automatically.

3 Media Storage

3.1 Implementation Model

3.1.1 Application Data Flow Diagram

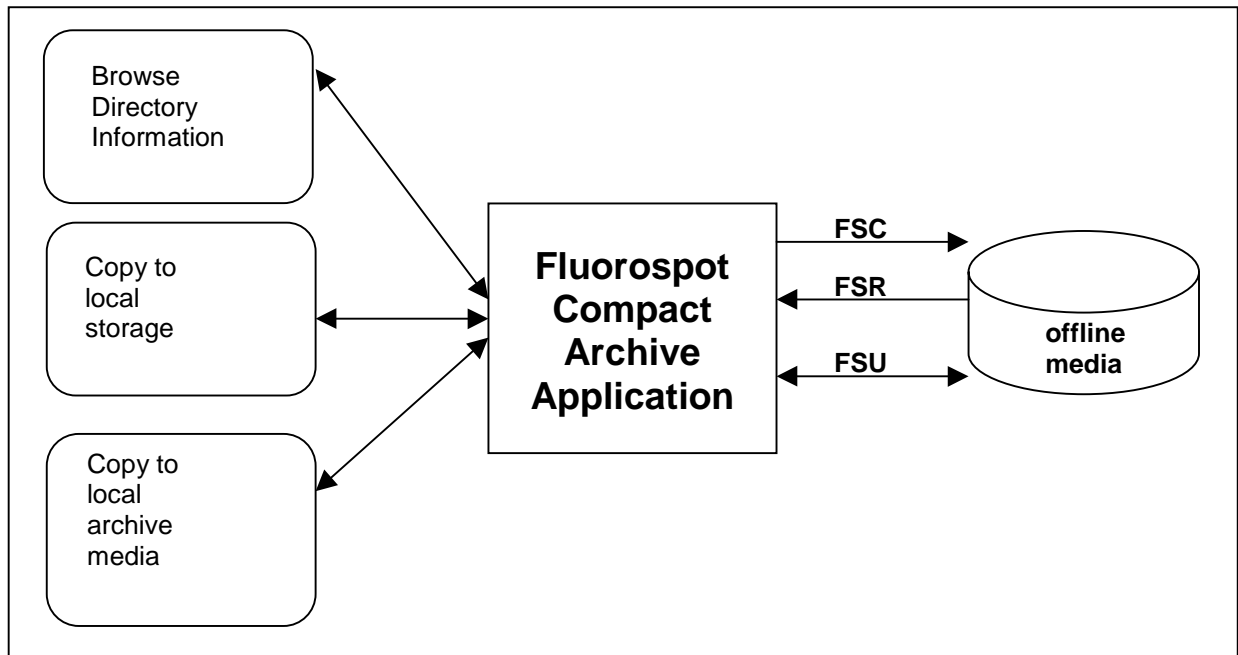


Figure 2: FLUOROSPOT® Compact DICOM Media Storage Implementation Model

The DICOM archive application will serve as an interface to the CD-R offline medium device. It reads the offline media directory into the browser and copies SOP instances to a medium or retrieve SOP Instances from the offline medium.

The DICOM Archive application will support CD-R only.

3.1.2 Functional definitions of AE's

The DICOM offline media storage application consisting of the DICOM Archive application entity interfaces the offline media. The DICOM Archive application supports:

1. creating a new File-set (FSC).
2. updating an existing File-set by adding new SOP Instances to the medium (FSU)
3. copying SOP Instances from the medium to local storage (FSR)
4. reading the File-set's DICOMDIR information.

3.1.3 Sequencing of Real-World Activities

There are no special sequencing requirements.

3.1.4 File Meta Information Options

Implementation Class UID	1.3.12.2.1107.5.3.4
Implementation Version Name	Siemens_FLC_20

Table 5: File Meta Information

3.2 AE Specifications

3.2.1 DICOM Archive Specification

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

The following Table 6 shows the Application Profiles, Activities and roles for DICOM Archive.

Application Profiles Supported	Real World Activity	Role	SC Option
STD-GEN-CD	Browse Directory Information	FSR	Interchange
	Copy local Storage	FSR	Interchange
	Copy to archive media	FSC, FSU	Interchange

Table 6: Application Profiles, Activities and roles for DICOM Archive

3.2.1.2 Real-World Activities for this Application Entity

3.2.1.2.1 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 add the directory entries to the local database.

Value precedence (Detached Patient Management) is not supported.

3.2.1.2.1.1 Application Profiles for the RWA: Browse Directory Information

See Table 6 above for the Application Profiles listed that invoke this Application Entity for the Browse Directory Information RWA.

3.2.1.2.2 Real-World Activity: Copy to local Storage

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

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

Value precedence (Detached Patient Management) is not supported.

SOP Class Name	SOP Class UID
X-ray Radiofluoroscopy Image Storage	1.2.840.10008.5.1.4.1.1.12.2

Table 7: Supported SOP Classes

3.2.1.2.2.1 Application Profiles for the RWA: Import into local Storage

See Table 7 above for the Application Profiles listed that invoke this Application Entity for the Copy to Local Storage RWA.

3.2.1.2.3 Real-World Activity: Copy to local Archive Media

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

The DICOM Archive application will receive a list of SOP Instances to be copied to the local archive medium. According to the state of the medium inserted (new medium, Medium with DICOM file-set) the SOP Instances are either updated or created on the media. Only valid SOP Instances are accepted.

The DICOM Archive application will not close the medium.

SOP Class Name	SOP Class UID
X-ray Radiofluoroscopy Image Storage	1.2.840.10008.5.1.4.1.1.12.2

Table 8: Supported SOP Classes

3.2.1.2.3.1 Application Profiles for the RWA: Copy to local Archive Media

See Table 8 above for the Application Profiles listed that invoke this Application Entity for the Copy to local Archive RWA.

3.3 Augmented and Private Profiles

3.3.1 Augmented Application Profiles

not applicable

3.3.2 Private Application Profiles

not applicable

3.4 Extensions, Specializations and privatizations of SOP Classes and transfer Syntaxes

Restrictions and Extensions:

1. It is possible to store images on CD in a “packed” manner. This will result in a DICOMDIR containing “PRIVATE” records instead of “IMAGE” records.
2. IODs on local Archive Media are stored in native format. Special postprocessing variables are kept in private attributes. Therefore, some IODs might look differently or could not be displayed properly on remote DICOM nodes.
3. It is possible to update a CD containing unpacked images with packed images and vice versa.
4. The user has to select from the user interface if the images to be stored are in packed or unpacked format.

3.5 Configuration

3.5.1 AE Title Mapping

3.5.1.1 Configurable Parameters

Not applicable

3.6 Support of Extended Character Sets

ISO-IR 100 (ISO 8859-1:1987 Latin Alphabet N 1. Supplementary set)
ISO-IR 144 (ISO 8859-5:1988 Latin/Cyrillic Alphabet supplementary set)

If the FLUOROSPOT® Compact is configured for cyrillic character set support, ISO-IR 144 will be used automatically.

4 Worklist Management

4.1 Implementation Model

4.1.1 Application Data Flow Diagram

Worklist Update is performed as a result of an operator request. Each request results in an initiation for an association. Under normal conditions the association will be closed after receiving a "Success" response from the Information System.

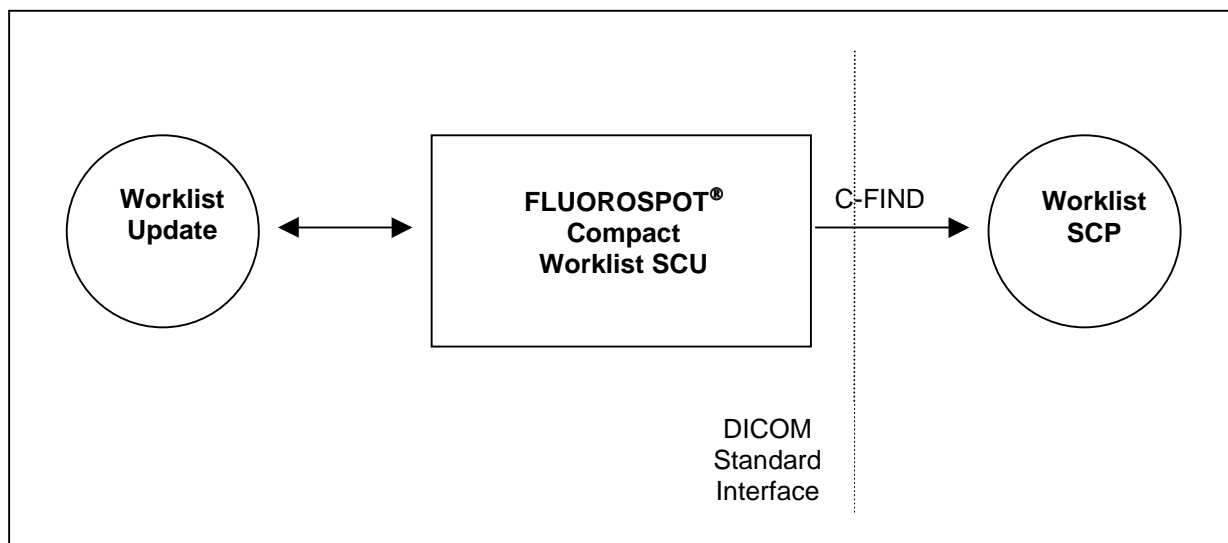


Figure 3: FLUOROSPOT® Compact DICOM Worklist Implementation Model

4.1.2 Functional Definition "Worklist Update"

The FLUOROSPOT® Compact DICOM Application Entity acts as a Service Class User (SCU) for the

- Basic Worklist Management Service Class (to request a Worklist from a RIS)

The request for a Worklist Update is initiated by user interaction, i.e. pressing the button "Update" or automatically at specific time intervals, configurable by the user.

Upon initiation of the request, the FLUOROSPOT® Compact will build an Identifier for the C-FIND request, will initiate an association to send the request and will wait for Worklist responses. After retrieval of all responses, FLUOROSPOT® Compact will access the local data base to add or update patient demographic data.

FLUOROSPOT® Compact always requests all items for a Scheduled Procedure Step Start Date (actual date), Modality (RF), Scheduled Station AE Title. Query for the Scheduled Station AE Title is configurable by a FSE.

If any other SCP response status than "Success" or "Pending" is received by FLUOROSPOT® Compact, a message "update failed" will appear on the user interface.

The FLUOROSPOT® Compact Worklist Request Identifier is described in Annex B "Siemens Worklist Request Identifier Description".

4.1.3 Sequencing of Real-World Activities

not applicable

4.2 AE Specification

The FLUOROSPOT® Compact Application Entity provides Standard Conformance to the following DICOM SOP Class as a SCU:

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

Table 9: Supported SOP Classes as SCU

4.2.1 Association Establishment Policies

4.2.1.1 General

Application Context Name (ACN)	1.2.840.10008.3.1.1.1
PDU maximum length	16 kB

Table 10: ACN and PDU

4.2.1.2 Number of Associations

FLUOROSPOT® Compact will attempt to initiate one association for a Worklist Update request.

4.2.1.3 Asynchronous Nature

Asynchronous communication, i.e. multiple outstanding transactions over a single association, is not supported. All transactions are done in a synchronous way, one by one.

4.2.1.4 Implementation Identifying Information

Implementation Class UID	1.3.12.2.1107.5.3.4
Implementation Version Name	Siemens_FLC_20

Table 11: Implementation Identifying Information

4.2.2 Association Initiation by Real-World Activity

FLUOROSPOT® Compact will attempt to initiate a new association for:

- DICOM Worklist Update (C-FIND)

4.2.2.1 Associated Real-World Activity

Worklist Update attempts to download a Worklist from a remote node. If the FLUOROSPOT® Compact AE establishes an association to a remote AE, it will transfer all worklist items via the open association.

4.2.2.2 Proposed Presentation Context (Presentation Context Table)

The DICOM Interface of the FLUOROSPOT® Compact will propose the following presentation contexts:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Information Model FIND	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM 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
Verification SOP Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM 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/ SCP	None

Table 12: Presentation Context Table

4.2.2.3 SOP Specific Conformance Statement

Please refer to Annex B for the description of the Siemens Worklist Request Identifier.

4.2.3 Association Acceptance Policy

not applicable

4.3 Communication Profiles

4.3.1 Supported Communication Stacks (part 8)

The DICOM Interface of the FLUOROSPOT® Compact provides DICOM TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

4.3.2 TCP/IP Stack

The DICOM Interface of the FLUOROSPOT® Compact uses the TCP/IP stack from the Windows NT 4.0 (Service Pack 4.0) Operating system upon which it executes.

4.3.3 Physical Media Support

The DICOM Interface of the FLUOROSPOT® Compact is indifferent to the physical medium over which TCP/IP executes.

4.4 Extensions/Specializations/Privatizations

4.4.1 Standard Extended Basic Worklist Management

None

4.4.2 Private Transfer Syntaxes

None

4.5 Configuration

4.5.1 AE Title/Presentation Address Mapping

The Application Entity Title, Host name and Port number are defined via the service configuration tool. This tool is intended to be used by a FSE only.

4.5.2 Configurable Parameters

The Application Entity Titles, Host names and Port numbers are configured using the Service tool. Query for AET has to be configured by a FSE.

Other default values configurable via the Service tool are described in 4.5.2.2 and 4.5.2.3.

4.5.2.1 Number of Simultaneous Associations

FLUOROSPOT® Compact supports for one service only one association at a time.

4.5.2.2 Maximum PDU Size

- max PDU size: 16 kB

4.5.2.3 Time Out

- time-out until a SCP has to accept/reject an association request: 15 sec
- time-out for accepting a message over network: 30 sec

4.6 Support of Extended Character Sets

ISO-IR 100 (ISO 8859-1:1987 Latin Alphabet N 1. supplementary set)
ISO-IR 144 (ISO 8859-5:1988 Latin/Cyrillic Alphabet supplementary set)

If the FLUOROSPOT® Compact is configured for cyrillic character set support, ISO-IR 144 will be used automatically.

5 Print Management

5.1 Implementation Model

5.1.1 Application Data Flow Diagram

The print management service classes define an application class of services which enables the printing of images on a hardcopy medium. The print management SCU and print management SCP are peer DICOM print management application entities. The FLUOROSPOT® Compact basic print application supports the print management DIMSE services to act as a SCU.

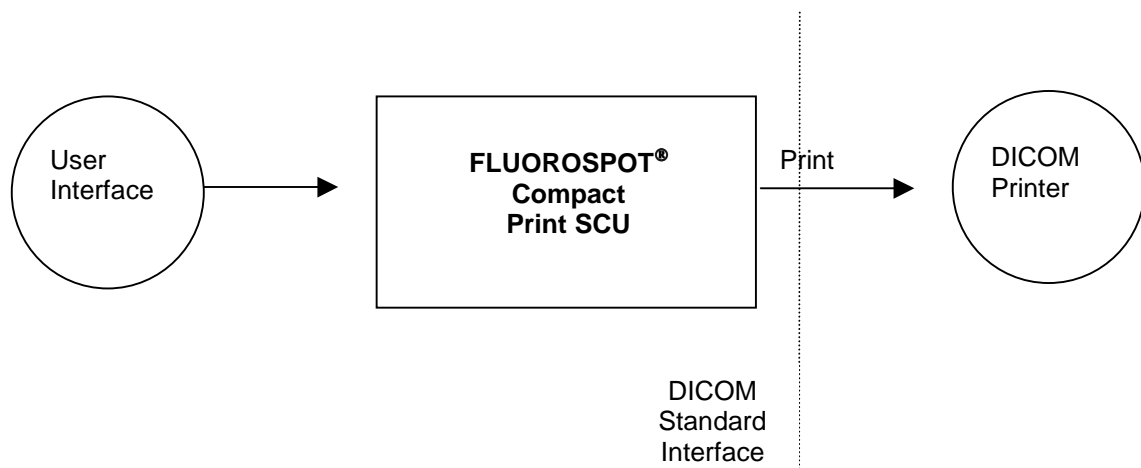


Figure 4: FLUOROSPOT® Compact DICOM Print Implementation Model

5.1.2 Functional Definition "Print"

The FLUOROSPOT® Compact DICOM Application Entity acts as a Service Class User (SCU) for the

- Basic Print Management Service Class

Images are transmitted to a camera in accordance with the DICOM Basic Print standard. The SCU invokes a print job and uses the SOP classes of the Basic Grayscale Print Management Meta SOP Class for acquiring all the information which is required for a film session. The N-Action is used to print the film box. After printing all requested film boxes, N-Delete is used to delete the film session.

The following SOP Classes are implemented:

- Basic Film Session SOP class
- Basic Film Box SOP class
- Basic Grayscale Image Box SOP class
- Printer SOP Class

By default, FLUOROSPOT® Compact will not retry to initiate another association automatically if printing failed. However, an automatic retry can be configured by a FSE.

5.1.3 Sequencing of Real-World Activities

not applicable

5.2 AE Specification

The FLUOROSPOT® Compact Application Entity provides Standard Conformance to the following DICOM SOP Class as a 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

Table 13: Supported SOP Classes

5.2.1 Association Establishment Policies

5.2.1.1 General

Application Context Name (ACN)	1.2.840.10008.3.1.1.1
PDU maximum length	16 kB

Table 14: ACN and PDU

5.2.1.2 Number of Associations

FLUOROSPOT® Compact will attempt to initiate one association for a print request.

5.2.1.3 Asynchronous Nature

Asynchronous communication, i.e. multiple outstanding transactions over a single association, is not supported. All transactions are done in a synchronous way, one by one.

5.2.1.4 Implementation Identifying Information

Implementation Class UID	1.3.12.2.1107.5.3.4
--------------------------	---------------------

Implementation Version Name	Siemens_FLC_20
-----------------------------	----------------

Table 15: Implementation Identifying Information

5.2.2 Association Initiation by Real-World Activity

FLUOROSPOT® Compact will attempt to initiate a new association for:

- One Basic Film Session

5.2.2.1 Associated Real-World Activity

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

5.2.2.2 Proposed Presentation Context (Presentation Context Table)

The DICOM Interface of the FLUOROSPOT® Compact will propose the following presentation contexts:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM 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
Verification SOP Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM 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/SCP	None

Table 16: Presentation Context Table

5.2.2.3 SOP Specific Conformance Statement

not applicable

5.2.3 Association Acceptance Policy

not applicable

5.3 Communication Profiles

5.3.1 Supported Communication Stacks (part 8)

The DICOM Interface of the FLUOROSPOT® Compact provides DICOM TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

5.3.2 TCP/IP Stack

The DICOM Interface of the FLUOROSPOT® Compact uses the TCP/IP stack from the Windows NT 4.0 (Service Pack 4.0) Operating system upon which it executes.

5.3.3 Physical Media Support

The DICOM Interface of the FLUOROSPOT® Compact is indifferent to the physical medium over which TCP/IP executes.

5.4 Extensions/Specializations/Privatizations

5.4.1 Standard Extended Basic Print Management

None

5.4.2 Private Transfer Syntaxes

None

5.5 Configuration

5.5.1 AE Title/Presentation Address Mapping

The Application Entity Title, Host name and Port number are defined via the service configuration tool. This tool is intended to be used by a FSE only.

5.5.2 Configurable Parameters

The Application Entity Titles, Host names and Port numbers are configured using the Service tool.

Other default values configurable via the Service tool are described in 5.5.2.2 and 5.5.2.3.

5.5.2.1 Number of Simultaneous Associations

FLUOROSPOT® Compact supports for one service only one association at a time.

5.5.2.2 Maximum PDU Size

- max PDU size: 16 kB

5.5.2.3 Time Out

- time-out until a SCP has to accept/reject an association request: 25 sec
- time-out for accepting a message over network: 25 sec

5.6 Support of Extended Character Sets

ISO-IR 100 (ISO 8859-1:1987 Latin Alphabet N 1. supplementary set)
ISO-IR 144 (ISO 8859-5:1988 Latin/Cyrillic Alphabet supplementary set)

Annex A: Siemens DICOM IOD Description

Module	Attribute Name	TAG	Type	Comments
Patient	Patient's Name	0010,0010	2	"Last Name^First Name"
	Patient ID	0010,0020	2	
	Patient's Birth Date	0010,0030	2	
	Patient's Sex	0010,0040	2	
General Study	Study Instance UID	0020,000D	1	
	Study Date	0008,0020	2	
	Study Time	0008,0030	2	
	Referring Physician's Name	0008,0090	2	from Modality Worklist
	Study ID	0020,0010	2	Request ID in Study List
	Accession Number	0008,0050	2	
	Study Description	0008,1030	3	Comment text box in Study list
General Series	Modality	0008,0060	1	"RF"
	Series Instance UID	0020,000E	1	
	Series Number	0020,0011	2	
	Performing Physician's Name	0008,1050	3	Physician field in Study list
	Series Description	0008,103E	3	Organ from Study List
	Protocol Name	0018,1030	3	Organ program
General Equipment	Manufacturer	0008,0070	2	"SIEMENS "
	Institution Name	0008,0080	3	
	Manufacturer's Model Name	0008,1090	3	"FLUOROSPOT_COMPACT"
	Device Serial Number	0018,1000	3	
General Image	Image Number	0020,0013	2	
	Patient Orientation	0020,0020	2C	Empty field
	Image Date	0008,0023	2C	
	Image Time	0008,0033	2C	
	Acquisition Number	0020,0012	3	
	Image Pixel or X-ray Image	Samples per Pixel	0028,0002	1
Photometric Interpretation		0028,0004	1	MONOCHROME2
Rows		0028,0010	1	1024
Columns		0028,0011	1	1024
Bits Allocated		0028,0100	1	16
Bits Stored		0028,0101	1	10
High Bit		0028,0102	1	9
Pixel Representation		0028,0103	1	0000H
Pixel Data		7FE0, 0010	1	
Overlay Plane (Only present if the image contains graphics)		Overlay Rows	6000,0010	1
	Overlay Columns	6000,0011	1	1024
	Overlay Type	6000,0040	1	"G"
	Origin	6000,0050	1	1\1
	Overlay Bits Allocated	6000,0100	1	16
	Bit Position	6000,0102	1	12
VOI LUT	Window Center	0028,1050	3	-256.. 1280
	Window Width	0028,1051	1C	1.. 2048
SOP Common	SOP Class UID	0008,0016	1	
	SOP Instance UID	0008,0018	1	
	Specific Character Set	0008,0005	1C	"ISO_IR 100" or "ISO_IR 144"

Table A.1: Elements included in both XRF and SC IODs

Module	Attribute	TAG	Type	Comments
X-Ray Image	Image Type	0008,0008	1	ORIGINAL\PRIMARY\SINGLE PLANE\DSA (acquired images)
				ORIGINAL\SECONDARY\SINGLE PLANE (post-processed images)
	Pixel Intensity Relationship	0028,1040	1	"LIN "
X-Ray Acquisition	KVP	0018,0060	2	
	Radiation Setting	0018,1155	1	"GR"
	Exposure time	0018,1150	2C	
	X-Ray Tube Current	0018,1151	2C	
	Radiation Mode	0018,115A	3	"CONTINUOUS"
	Intensifier Size	0018,1162	3	
XRF Tomo Acquisition (Module included only in Tomographic images)	Tomo Layer Height	0018,1460	1	
	Tomo Angle	0018,1470	3	
	Tomo Time	0018,1480	3	
Display Shutter	Shutter Shape	0018,1600	1	"RECTANGULAR\CIRCULAR"
	Shutter Left Vertical Edge	0018,1602	1C	
	Shutter Right Vertical Edge	0018,1604	1C	
	Shutter Upper Horizontal Edge	0018,1606	1C	
	Shutter Lower Horizontal Edge	0018,1608	1C	
	Center of Circular Shutter	0018,1610	1C	
	Radius of Circular Shutter	0018,1612	1C	
Visit Status	Current Patient Location	0038,0300		From Modality Worklist

Table A.2: Additional Standard elements included in RF IOD

Module	Attribute Name	TAG	Type	Comments
SC Equipment	Conversion Type	0008,0064	1	"DI"
Visit Status	Current Patient Location	0038,0300		From Modality Worklist

Table A.3: Additional Standard elements included in Secondary Capture IOD

Annex B: Siemens Worklist Request Identifier Description

Module Name Attribute Name	Matching Key Type	Return Key Type	Tag	M	R	Included In image header	DICOM Part 3 Tables
Scheduled Procedure Step							C.4-10
Scheduled Procedure Step Sequence	R	1	0040,0100				
➤ Modality	R	1	0008,0060	F		x	
➤ Scheduled Station AE Title	R	1	0040,0001	F			
➤ Scheduled Procedure Step Start Date	R	1	0040,0002	R			
➤ Scheduled Procedure Step Start Time	O	1	0040,0003				
➤ Scheduled Performing Physician's Name	O	2	0040,0006				
➤ Scheduled Procedure Step Description	O	1C	0040,0007				
➤ Scheduled Procedure Step Location	O	2	0040,0011				
➤ Pre-Medication	O	2C	0040,0012				
➤ Scheduled Procedure Step ID	O	1	0040,0009				
➤ Requested Contrast Agent	O	2C	0032,1070				
Requested Procedure							C.4-11
Requested Procedure ID	O	1	0040,1001		x	Note 1	
Requested Procedure Description	O	1C	0032,1060		x	Note 2	
Study Instance UID	O	1	0020,000D		x	x	
Requested Procedure Priority	O	2	0040,1003				
Imaging Service Request							C.4-12
Accession Number	O	2	0008,0050		x	x	
Referring Physician	O	2	0008,0090			x	
Visit Status							C.3-3
Current Patient Location	O	2	0038,0300		x	x	
Patient Identification							C.2-2
Patient Name	R	1	0010,0010	*		x	
Patient ID	R	1	0010,0020		x	x	
Patient Demographic							C.2-3
Patient's Birth Date	O	2	0010,0030		x	x	
Patient's Sex	O	2	0010,0040		x	x	
Patient Medical							C.2-4
Medical Alerts	O	2	0010,2000		x		
Contrast Allergies	O	2	0010,2110		x		

Table B.1: Worklist Request Identifier

Matching Types

M: Matching Key

F: Fixed Single Value (RF)

R: Range matching for start date only (always for actual date, i.e. 20000328-20000328)

*: Wildcard matching for Patient Name

R: Return Keys

x: Universal Matching

The Information Model Module Table defines the fixed structure of the Worklist Request Identifier. The table should be read as follows:

- First column: Module Name and attributes supported to build a FLUOROSPOT® Compact Worklist Request Identifier.
- Second column: Requested [R] or optional [O] Matching key. FLUOROSPOT® Compact assumes that the Modality Worklist SCP supports Matching Keys as defined in DICOM PS 3.4 K.2.2.1.1, i.e. that a SCP is able to at least perform Fixed Single Value, Wildcard and Date Range matching.

- Third column: Mandatory, conditional and optional Return key.
- Fourth column: Appropriate DICOM tag for this attribute.
- Next two columns: FLUOROSPOT® Compact only expects a "Fixed Value Matching" for "Modality", "Range Matching" for "Scheduled Procedure Step Start Date" and Wildcard Matching for Patient Name and Patient ID FLUOROSPOT® Compact always asks for the complete Worklist for the actual date and one specific modality (SC or RF). All other attribute are defined as Return Keys only. FLUOROSPOT® Compact expects the Worklist SCP to support also the optional attributes "Current Patient Location" and "Admitting Diagnosis Description".
- Last column: Reference to the DICOM standard

The default Query Configuration is set to "Modality" (RF) and "Date" (date of today). Optionally, additional matching for the own AET is configurable.

Note 1: Requested Procedure ID (0040,1001) is not directly included in the header. However, its value is stored in the header as Study ID (0020,0010). It can not be modified by the user.

Note 2: Requested Procedure Description (0032,1060) is not directly included in the header. However, its value is stored in the header as Study Description (0008,1030). It can be modified by the user.

Annex C: Siemens Basic Grayscale Print

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, that are printed on a hardcopy printer.

DIMSE Service Element	Usage SCU/SCP
N-Create	M/M
N-Delete	U/M

Table C.1: Used DIMSE services

Attribute name	Tag	Usage SCU/SCP	Supported Values
Number of Copies	2000,0010	U/M	set by user
Print Priority	2000,0020	U/M	MED

Table C.2: Used attributes

Service Status	Meaning	Protocol Codes
Success	Film Session successfully created	0000
Warning	Memory allocation not supported	B600
Warning	Attribute Value Out of Range	0116
Warning	Film session printing (collation) is not supported	B601
Warning	Film session SOP Instance hierarchy does not contain Image Box SOP Instance (empty page)	B602
Warning	Image size is larger than image box size, the image has been demagnified.	B604
Failure	Missing attribute value	0121
Failure	Unable to create print job, print queue is full (Film Session)	C601
Failure	Image size is larger than image box size	C603
Failure	Insufficient memory in printer to store the image	C605
Failure	More than one VOI LUT Box contained in image	C606
Failure	No such argument	0114
Failed	Processing Failure	0110
Failed	Unrecognized Operation	0211

Table C.3: Status handling

Basic Film Box SOP Class:

The Basic Film Box information object definition describes all the user defined parameters 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.

DIMSE Service Element	Usage SCU/SCP
N-Create	M/M
N-ACTION	M/M

Table C.4: Used DIMSE services

Attribute name	Tag	Usage SCU/SCP	Supported Values
Image Display Format	2010,0010	M/M	
Referenced Film Session Sequence	2010,0500	M/M	
>Referenced SOP Class UID	0008,1150	M/M	
>Referenced SOP Instance UID	0008,1155	M/M	
Referenced Image Box Sequence	2010,0510	-/M	
>Referenced SOP Class UID	0008,1150	-/M	
>Referenced SOP Instance UID	0008,1155	-/M	
Film Orientation	2010,0040	M/M	PORTRAIT, LANDSCAPE
Film Size ID	2010,0050	M/M	14IN*17IN 14IN*14IN 11IN*14IN 8IN*10IN

Table C.5: Mandatory Film Box N-Create attributes

Service Status	Meaning	Protocol Codes
Success	Film Box successfully created	0000
Warning	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	B605
Warning	Film box does not contain image box (empty page)	B603
Warning	Image Size is larger than image box size, the image has been demagnified	B604
Failure	Invalid Attribute Value	0106
Failure	Unable to create Print Job SOP Instance, Print Queue is full (Film Box)	C602
Failure	Image size is larger than image	C603

	box size	
Failure	Resource limitation	0213
Failed	Unrecognized operation	0211

The FLUOROSPOT® Compact displays at N-ACTION-Response Code 0000 (Success) the message „image transferred“.

Table C.6: Status handling

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 description describes the presentation parameters and image pixel data which apply to a single image of a sheet of film.

DIMSE Service Element	Usage SCU/SCP
N-SET	M/M

Table C.7: Used DIMSE services

Attribute name	Tag	Usage SCU/SCP	Supported Values
Image Position	2020,0010	M/M	Dependent on Display Format
Basic Grayscale Image Sequence	0020,0110	M/M	
>Sample Per Pixel	0028,0002	M/M	1
>Photometric Interpretation	0028,0004	M/M	MONOCHROME2
>Rows	0028,0010	M/M	1024
>Columns	0028,0011	M/M	1024
>Pixel Aspect Ratio	0028,0034	M/M	1/1
>Bits Allocated	0028,0100	M/M	8
>Bits Stored	0028,0101	M/M	8
>High Bit	0028,0102	M/M	7
>Pixel Representation	0028,0103	M/M	0000
>Pixel Data	7FE0,0010	M/M	OB

Table C.8: Mandatory Basic Grayscale Image Box N-SET attributes

Service Status	Meaning	Protocol Codes
Success	Film accepted for printing	0000
Warning	Image size larger than image box size, the image has been demagnified	B604
Warning	Requested Min Density or Max Density outside of printer's operating range. The printer will use its respective minimum or maximum density value instead.	B605
Warning	Attribute Value Out of Range	0116
Failure	Image size is larger than image box size	C603
Failure	Insufficient memory in printer to store images	C605
Failure	Missing attribute Value	0121
Failure	Invalid attribute Value	0106

The FLUOROSPOT® Compact displays at Code 0000 (Success) the message „image transferred“.

Table C.9: Status handling

Printer SOP Class:

The Printer SOP Class provides the possibility to monitor the status of the hardcopy printer in a synchronous way.

DIMSE Service Element	Usage SCU/SCP
N-GET	U/M
N-EVENT-REPORT	M/M

The FLUOROSPOT® Compact writes all warning and failure messages into a log file.

Table C.10: Used DIMSE services

Attribute name	Tag	Usage SCU/SCP
Printer Status	2110,0010	U/M
Printer Status Info	2110,0020	U/M

Table C.11: Mandatory Printer N-GET attributes

Annex D: DICOMDIR Attributes

The DICOMDIR file will contain the following attributes for the levels Patient – Study – Series – Image – Private

DICOMDIR keys:

Attribute Name	Tag	Type	Notes
File-Set identification			
File-set ID	(0004,1130)	2	volume label of media
Directory information			
Offset of the First Directory Record of the Root Directory Entry	(0004,1200)	1	
Offset of the Last Directory Record of the Root Directory Entity	(0004,1202)	1	
File-set Consistency Flag	(0004,1212)	1	0000H
Directory Record Sequence	(0004,1220)	2	
> Offset of the Next Directory Record	(0004,1400)	1C	
> Record In-use flag	(0004,1410)	1C	FFFFH
> Offset of Referenced Lower-Level Directory Entity	(0004,1420)	1C	
> Directory Record Type	(0004,1430)	1C	PATIENT, STUDY, SERIES, IMAGE, PRIVATE
> Private record UID	(0004,1432)	1C	for the Directory Record of Type PRIVATE
> Referenced File ID	(0004,1500)	1C	contains the filename on media for the Directory Record of Type IMAGE
> Referenced SOP Class UID in File	(0004,1510)	1C	for the Directory Record of Type IMAGE
> Referenced SOP Instance UID in File	(0004,1511)	1C	for the Directory Record of Type IMAGE
> Referenced Transfer Syntax UID in File	(0004,1512)	1C	for the Directory Record of Type IMAGE
> Record Selection Keys	see below		
Patient Keys			Directory Record Type PATIENT
Specific Character Set	(0008,0005)	1C	
Patient's Name	(0010,0010)	2	
Patient ID	(0010,0020)	1	
Date Of Birth	(0010,0030)	3	
Patient's Sex	(0010,0040)	3	
Study Keys			Directory Record Type STUDY
Specific Character Set	(0008,0005)	1C	
Study Date	(0008,0020)	1	

Study Time	(0008,0030)	1	
Accession Number	(0008,0050)	2	
Study Description	(0008,1030)	2	
Study Instance UID	(0020,000D)	1C	
Study ID	(0020,0010)	1	
Series Keys			Directory Record Type SERIES
Specific Character Set	(0008,0005)	1C	
Modality	(0008,0060)	1	
Series Description	(0008,103E)	3	
Performing Physician	(0008,1050)	3	
Series Instance UID	(0020,000E)	1	
Series Number	(0020,0011)	1	
Image Keys			Directory Record Type IMAGE
Image Number	(0020,0013)	1	