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DUET DRF

High Resolution Digital Imaging System
for PLATINUM dRF and OPTIMA dRF



Dicom Conformance Statement

Original version
D5Z-40-007 Revision B

History of Revisions

This Dicom Conformance Statement belongs to the High Resolution Digital Imaging System for PLATINUM dRF and OPTIMA dRF.

The original version of this manual referring to DUET Product Lines has been drafted in the English language by THALES. The current version is referenced RAD16_1Y128 Revision 003.

This equipment is integrated by APELEM-DMS Group in PLATINUM dRF and OPTIMA dRF Digital Remote Controlled Systems and it is marketed under the designation “DICOM Conformance Statement DUET DRF”. The equivalent reference for this manual is: D5Z-40-007 Rev.B.

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0	02/22/2011	1st edition	All	All
A	09/23/2015	Removed bitmap overlay report type	All	All
B	09/07/2016	Add Radiation Dose Structured Report, Exposure Index	All	All

Non-contractual pictures

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1. Important Information

The information provided herein is proprietary work.

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The contents of this publication are subject to change without prior notice and without any legal obligation.

2. Conformance Statement Overview

This version of the DICOM Conformance Statement applies to DUET DRF system and will be called as 'the system' from now to the rest of this document.

The system provides the following DICOM data exchange features:

It allows the operator to store images directly on the system's hard disk. Images can be exported to a DICOM archive server or workstation on a network or printed using a DICOM-compliant printer.

It can request commitment for storage from the archive server.

It is able to write DICOM media CD, CD-RW disks

It is able to write DICOM media DVD+/-R, DVD+/-RW disks.

The user is capable of querying a DICOM Worklist Server for a list of scheduled patients. Information regarding the procedure(s) performed can be transferred to a Modality Performed Procedure Step (MPPS) Server.

The following table presents an overview of all network services and the applicable SOP Classes as provided by the system.

The first column specifies the used SOP classes exactly as named in PS 3.6. (Ref. PS 3.2 Annex A.) of the current DICOM Standard.

Table 1 - Network Services Supported By the SYSTEM

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Computed Radiography Image Storage	Yes	No
Secondary Capture Image Storage	Yes	No
X-Ray Angiographic Image Storage	Yes	No
X-Ray Radiofluoroscopic Image Storage	Yes	No
X-Ray Radiation Dose SR Storage	Yes	No
Workflow		
Modality Performed Procedure Step	Yes	No
Modality Worklist Information Model - FIND	Yes	No
Storage Commitment Push Model	Yes	No
Print Management		
Basic Film Box SOP Class	Yes	No
Basic Film Session SOP Class	Yes	No
Basic Grayscale Image Box SOP Class	Yes	No
Basic Grayscale Print Management Meta SOP Class	Yes	No
Grayscale Softcopy Presentation State Storage SOP Class	No	No
Presentation LUT SOP Class	No	No
Printer SOP Class	Yes	No

Table 2 - Media Services Supported

Media Storage Application Profile	Write Files (FSC)	Update Files (FSU)	Read Files (FSR)
Compact Disk – Recordable (CD-R)			
General Purpose CD-R Interchange	Yes	No	No
DVD			
General Purpose Interchange on DVD-RAM Media	Yes	No	No
USB			
Removable (Disk On Key)	Yes	No	No
External HD	Yes	No	No

Currently the system supports FSC service for: CD-R, CD-RW, DVD + R, DVD – R, DVD + RW, DVD – RW.

3. Introduction

3.1. Audience

This document is written for the people that need to understand how the system will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

3.2. Remarks

The DICOM Conformance Statement is contained in chapter 4 through 8 and follows the contents and structuring requirements of (DICOM) PS 3.2.

This DICOM Conformance Statement by itself does not guarantee successful interoperability of this equipment with other vendor equipment. The user (or user's agent) must be aware of the following issues:

3.2.1. Interoperability

Interoperability refers to the ability of application functions, distributed over two or more systems, to work successfully together. The integration of medical devices into an IT environment may require application functions that are not specified within the scope of DICOM standard. Consequently, using only the information provided by this Conformance Statement does not guarantee interoperability of this equipment with other vendor equipment.

It is the user's responsibility to analyze thoroughly the application requirements and to specify a solution that integrates this equipment with other vendor equipment.

3.2.2. Validation

This equipment has been carefully tested to assure that the actual implementation of the DICOM interface corresponds with this Conformance Statement. Where this equipment is linked to other vendor systems, the first step is to compare the relevant Conformance Statements.

This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

3.2.3. New versions of the DICOM Standard

The DICOM Standard will evolve in the future to meet the user's growing requirements and to incorporate new features and technologies. The manufacturer is actively involved in this evolution and plans to adapt its equipment to future versions of the DICOM Standard as it may be needed. In order to do so, the manufacturer reserves the right to make changes to its products.

The user should ensure that any other provider linking to the equipment also adapts to future versions of the DICOM Standard. If not, the incorporation of DICOM enhancements into the equipment may lead to loss of connectivity (in case of networking) and incompatibility (in case of media).

3.2.4. Terms and Definitions

- ④ Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.
- ④ Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, MWL Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.
- ④ Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.
- ④ Application Entity Title – the externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.
- ④ Application Context – the specification of the type of communication used between Application Entities. Example: DICOM network protocol.
- ④ Association – a network communication channel set up between Application Entities.
- ④ Attribute – a unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).
- ④ Information Object Definition (IOD) – the specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.
- ④ Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.
- ④ Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

- Module – a set of Attributes within an Information Object Definition that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.
- Negotiation – first phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.
- Presentation Context – the set of DICOM network services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.
- Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.
- Security Profile – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an Application Entity to ensure confidentiality, integrity, and/or availability of exchanged DICOM data
- Service Class Provider (SCP) – role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (MWL SCP).
- Service Class User (SCU) – role of an Application Entity that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU).
- Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.
- Service/Object Pair (SOP) Instance – information object; a specific occurrence of information exchanged in a SOP Class. Examples: a specific x-ray image.
- Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the “group” and the “element”. If the “group” number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010, 0020) [Patient ID], (07FE, 0010) [Pixel Data], (0019, 0210) [private data element].
- Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: JPEG compressed (images), little endian explicit value representation.
- Unique Identifier (UID) – a globally unique “dotted decimal” string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.
- Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person’s name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.2.5. Basics of DICOM Communication

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted in italics below. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two Application Entities (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network “handshake”. One of the two devices must initiate an Association (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (Negotiation).

DICOM specifies a number of network services and types of information objects, each of which is called an Abstract Syntax for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted Transfer Syntaxes. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association;

these combinations are called Presentation Contexts. The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on Roles – which one is the Service Class User (SCU - client) and which is the Service Class Provider (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (PDU) size, security information, and network service options (called Extended Negotiation information).

The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses, and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate Information Object Definition, and sent using the negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. Each transfer is explicitly acknowledged by the receiver with a Response Status indicating success, failure, or that query or retrieve operations are still in process.

Two Application Entities may also communicate with each other by exchanging media (such as a CD-R). Since there is no Association Negotiation possible, they both use a Media Application Profile that specifies “pre-negotiated” exchange media format, Abstract Syntax, and Transfer Syntax.

3.2.6. Acronyms and Abbreviations

AE	Application Entity
AET	Application Entity Title
CD-R	Compact Disk Recordable
CR	Computed Radiography
DICOM	Digital Imaging and Communications in Medicine
DIMSE	Dicom Message Service Element
DVD	Digital Versatile Disk
FSC	File-Set Creator
FSE	Field Service Engineer
FSR	File-Set Reader
FSU	File-Set Updater
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standards
LUT	Look-up Table
O	Optional (Key Attribute)
OP	Ophthalmic Photography
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
R	Required (Key Attribute)
RWA	Real World Activation
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SR	Structured Report
TCP/IP	Transmission Control Protocol/Internet Protocol
U	Unique (Key Attribute)
VR	Value Representation
XA	X-Ray

3.2.7. References

NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available free at <http://medical.nema.org/>

4. Network

4.1. Implementation Model

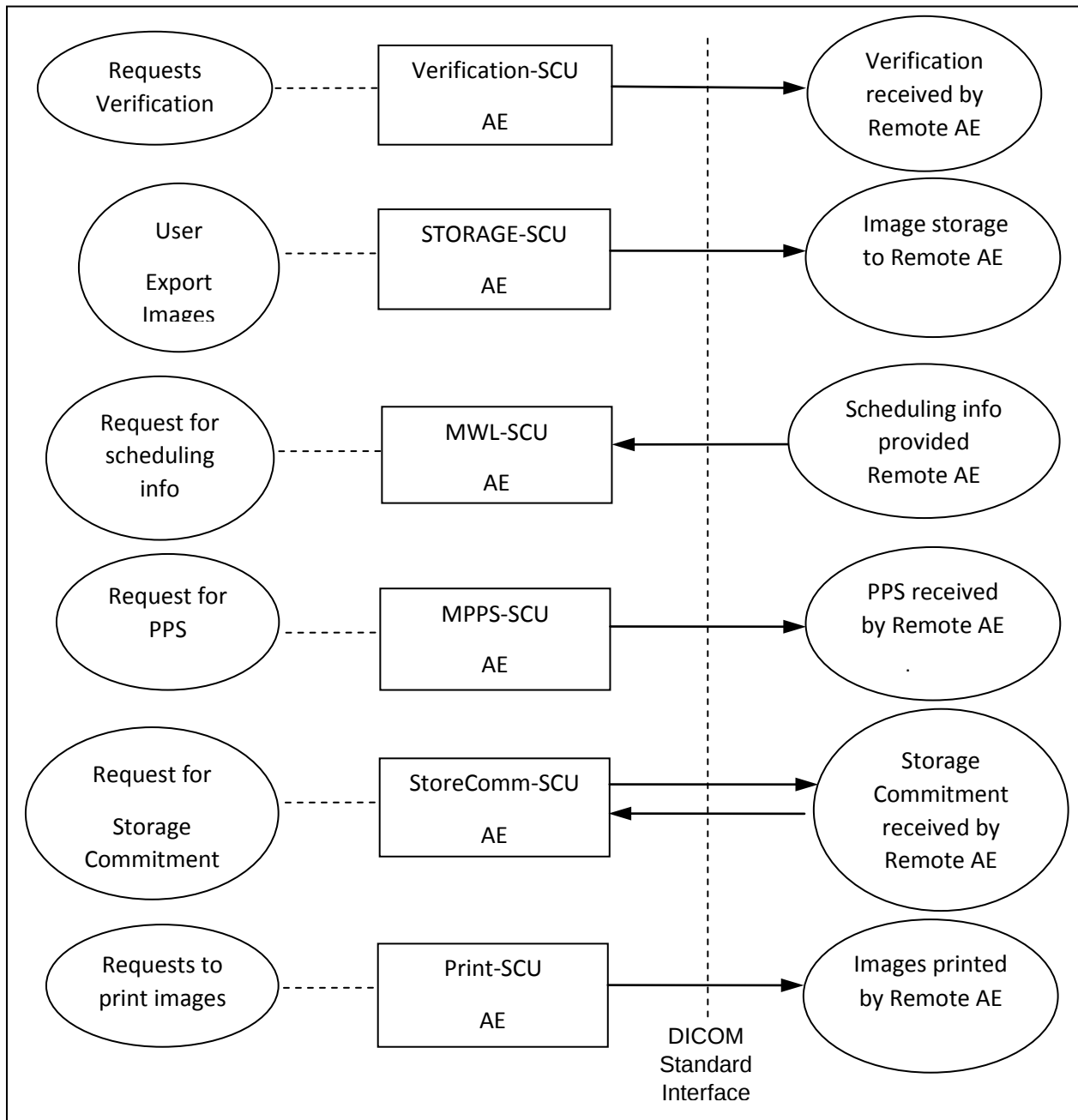
The implementation consists of a set of applications which provide a user interface, internal database and network listeners that spawn additional threads or processes as necessary to handle incoming connections, as well as media.

Conceptually the network services may be modeled as the following separate AEs, though in fact some AEs share (configurable) AE Titles:

- Verification-SCU
- STORAGE-SCU
- MWL-SCU
- MPPS -SCU
- Storage Commitment-SCU/SCP (StoreComm)
- Print-SCU

4.1.1. Application Data Flow

Figure 1 - Functional Overview



4.1.2. Functional Definition of AE's

This section describes in general terms the functions to be performed by the AE, and the DICOM services used to accomplish these functions.

4.1.2.1. Functional Definition of Verification-SCU

Verification-SCU is used to verify that a remote DICOM device is active on the network. It therefore performs the following tasks:

Establishes a DICOM association with a remote DICOM device.

Performs verification of the presence of a remote DICOM device in the network.

Closes the association after the verification process is completed.

4.1.2.2. Functional Definition of STORAGE-SCU

STORAGE-SCU is activated through the user interface when a user selects one study or more from the local database and requests that they be sent to a remote AE (selected from a preconfigured list).

The system AE application entity performs all the functions to transmit images and associated data to network servers and/or workstations. It therefore performs the following tasks:

Builds DICOM CR, RF, XA or SC Information Objects

Establishes a DICOM association with a remote DICOM device

Performs storage of the DICOM Information Object to a DICOM device

Closes the association after each Information Object is transferred

4.1.2.3. Functional Definition of MWL-SCU

The system AE supports the DICOM Basic Worklist Management as a SCU. The AE initiates an association to the active Worklist server when a Worklist query is selected via the Patient Registration screen. The System AE performs the following tasks:

Establishes a DICOM association with a remote DICOM device.

Issue a C-FIND request to get MWL Management scheduling information.

Retrieves patient list with Scheduled Procedure Step information from a remote DICOM device.

Closes the association once a matching list is received from the Worklist server.

4.1.2.4. Functional Definition of MPPS-SCU

The system AE supports the Modality Performed Procedure Step (MPPS) in the role of SCU. It performs the following tasks:

- ② Builds DICOM Modality Performed Procedure Step Objects.
- ② Establishes DICOM Association with a remote DICOM device.
- ② Performs transmit of DICOM Modality Performed Procedure Step Objects to a remote DICOM device including N-CREATE and N-SET requests to notify HIS/RIS by means of MPPS Service Class

- ➡ Closes the association once the relevant study details are transferred to the remote DICOM device

4.1.2.5. Functional Definition of StoreComm-SCU

The system AE supports the Storage Commitment push model in the role of SCU and SCP. The system AE performs the following tasks:

Builds DICOM Storage Commitment push model Objects.

Establishes DICOM Association with a remote DICOM device.

Performs transmit of DICOM Storage Commitment push model Objects to a remote DICOM device.

Closes the association once the relevant study details are transferred to the remote DICOM device.

Waits for association request from remote DICOM storage commitment device.

Accepts association requests and receives DICOM Storage Commitment push model Objects from the remote DICOM device.

4.1.2.6. Functional Definition of PRINT-SCU

PRINT-SCU provides all aspects of the Print Management SCU. It therefore performs the following tasks:

Builds DICOM Basic Grayscale Print Objects

Establishes an association with a remote DICOM device

Performs transmit DICOM Basic Grayscale Print Objects to a remote DICOM device

Closes the association after Information Objects are transferred.

4.1.2.7. Functional Definition of Media Storage-FSC

The system AE can create File Set on CD-R/DVD media or USB external device and write SOP instances.

4.1.3. Sequencing of Real-World Activities

All SCU activities are sequentially initiated in the user interface, and another activity may not be initiated until the prior activity has completed.

All SCP activities are performed asynchronously in the background and not dependent on any sequencing.

4.2. AE Specifications

The next section in the DICOM Conformance Statement is a set of application entity specifications. There are as many of these subsections as there are different AE's in the implementation.

An appropriate activity is described per DICOM compliant applications in the system per AE specification (if needed).

4.2.1. Association Policies

4.2.1.1. General

The DICOM standard application context name for DICOM 3.0 is always proposed:

Table 3 - DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

4.2.1.2. Implementation Identifying Information

Table 4 - DICOM Implementation Class and Version

Implementation Class UID	Implementation Version Name
2.16.840.1.113669.632.3.1.1.2.7	<system name>

4.2.1.3. Number of Associations

Table 5 - Number of Associations

Maximum number of simultaneous associations	10
---	----

4.2.1.4. Asynchronous Nature

The system does not support asynchronous operations communication for the same DICOM service.

4.2.2. Real-World Activity – Verification-SCU

The systems support Verification service Class as SCU. Verification is invoked in the DICOM configuration utility specifically for each DICOM service.

4.2.2.1. Proposed Presentation Contents - Verification

The system AE proposes the following Presentation Contents shown below:

Table 6 - Verification Presentation Context Table

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

4.2.2.2. Response Status

Verification-SCU will behave as described in the table below:

Table 7 - Verification-SCU Response Status Values

Service Status	Further Meaning	Status Codes	Behavior
Success	C-ECHO is complete	0000	The SCU has successful send C-ECHO

4.2.3. STORAGE-SCU AE Specification

Images can be transferred to one or more DICOM Store SCP, the system establishes an association with one identified DICOM device (i.e. one of the Network Archive Servers, Workstation Servers) at a time.

The system can be configured to automatically send the images at the end of the examination, or manually transfer selected images.

4.2.3.1. Automatic or manual transfer of images, series, study or patient unit

- ④ Acquired images are (configured) automatically sent upon end of acquisition.
- ④ Images may be transferred as full-resolution images or in sub-divided format, according to the selected acquisition mode.
- ④ The operator requests to send specific images after selecting them from the system's database.

- ③ In case the image transfer fails, the operator can manually attempt to resend the image at a later stage.
- ③ The requests are placed on a queue and executed in the background.

4.2.3.2. Automatic or manual transfer of images to a DICOM-compliant printer.

- ③ Acquired images are (configured) automatically sent upon the end of acquisition.
- ③ The film layout can be specified as desired, up to a maximum of 20 frames per film.
- ③ The operator requests to print specific images after selecting them from any of the system's applications.
- ③ In case an error occurs during the printing process, the operator can manually attempt to resend the film at a later stage.
- ③ The requests are placed on a queue and executed in the background.

4.2.3.3. SOP Classes

STORAGE-SCU provides Standard Conformance to the following SOP Classes:

Table 8 - SOP Classes for STORAGE-SCU AE

SOP Class Name	SOP Class UID	SCU	SCP
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	No
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	No
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	No
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	No
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Yes	No

4.2.3.4. Association Initiation Policy

STORAGE-SCU attempts to initiate a new association for each instance it attempts to send.

4.2.3.4.1. Activity - Send Storage AE

4.2.3.4.1.1. Description and Sequencing of Activities

For each study selected from the System to be transferred, a single attempt will be made to transmit it to the selected preconfigured remote AE. The STORAGE-SCU AE attempts to initiate a new association in order to issue a C-STORE request. If a job contains multiple instances then multiple C-STORE requests will be issued over the same Association.

An association is established when the user initiates a "Copy to" operation from any of the system applications. Individual images or entire examinations can be transferred to the selected DICOM Store device. The association is opened and closed for each image transfer. In case the transfer fails, images are queued and operator's intervention is required in order to resume data transfer.

Selection of manual or automatic transfer of images to the remote station is user-selectable.

4.2.3.4.1.2. Proposed Presentation Contexts

Table 9 - Proposed Presentation Contexts for STORAGE-SCU

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.2-7	See Table 4.2-7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

4.2.3.4.1.3. Extended Negotiation

No extended negotiation is performed.

4.2.3.4.1.4. SOP Specific Conformance

STORAGE-SCU provides standard conformance.

4.2.3.4.1.4.1. Presentation Context Acceptance Criterion

STORAGE-SCU does not accept associations.

4.2.3.4.1.4.1.2. Transfer Syntax Selection Policies

Any of the presentation contexts shown in table 4.2-8 are acceptable.

4.2.3.4.1.4.1.3. Response Status

STORAGE-SCU will behave as described in the table below:

Table 10 - STORAGE-SCU Response Status Values

Service Status	Further Meaning	Status Codes	Behavior
Failure	Refused: Out of Resources	A7xx	The user is notified and the failure is logged
	Error: Data Set does not match SOP Class	A9xx	The user is notified and the failure is logged
	Error: Cannot understand	Cxxx	The user is notified and the failure is logged
Warning	Coercion of Data Elements	B000	Ignored
	Data Set does not match SOP Class	B007	Ignored
	Elements Discarded	B006	Ignored
Success		0000	Ignored

4.2.3.5. Association Acceptance Policy

STORAGE-SCU does not accept associations.

4.2.4. Real-World Activity – MWL-SCU

The user requests a patient's list in the "Patient Registration Screen". When the operator retrieves the patient information list, the system establishes an association with the remote DICOM device.

4.2.4.1. Associated Real-World Activities

An association is established when the user initiates a Query (search) operation from the system "Patient Registration" screen.

Individual Patients or a group of patients can be registered from the MWL Management server. The association is opened when the user requests the patient information list and completed when all requested information is transferred.

4.2.4.2. Proposed Presentation Context

The system will use the Presentation Context shown in the following table:

Table 11 - MWL Presentation Context Table

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.2-7	See Table 4.2-7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

4.2.4.3. Specific Conformance - MWL

The system AE operation involves the following sequence of steps for each patient list transfer:

1. Association establishment (requestor only)
2. Data transfer
3. Association release

The system AE judges that the query was successful when the result of step (2) above is “success”.

4.2.4.4. AE Title/Presentation Address Mapping

This mapping is defined during the system installation procedure.

Both the local and remote names can be arbitrary defined.

4.2.4.5. Specific Conformance to MWL Service SOP Class

The Worklist AE provides conformance to the following DICOM Service SOP Classes as an SCU all at a standard extended level of conformance.

Table 12 - SOP Classes for MWL-SCU AE

SOP Class Name	SOP Class UID	SCU	SCP
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No

4.2.4.6. MWL Find SOP Class Information Object Definition

The following table provides the list of attributes requested in the MWL Query.

Request of most of the listed attributes depends on an internal software key that may be configured by the Installation/Service Engineer.

Table 13 - MWL Information Model Attributes

Attribute Name	Tag	Notes
SOP Common Module		
Specific Character Set	(0008,0005)	See Support of Character Sets
Scheduled Procedure Step Module		
Scheduled Procedure Step Sequence	(0040,0100)	
>Scheduled Station AE Title	(0040,0001)	
>Scheduled Procedure Start Date	(0040,0002)	Used as Query Criteria
>Scheduled Procedure Start Time	(0040,0003)	
>Modality	(0008,0060)	CR, RF or XA.
>Scheduled Performing Physician's Name	(0040,0006)	Used as Study Physician in the Patient Registration Screen.
>Scheduled Procedure Step Description	(0040,0007)	This attribute or (0032,1060) is used as Requested Procedure in the Patient Registration Screen.
>Scheduled Station Name	(0040,0010)	Used as Query Criteria
>Scheduled Procedure Step Location	(0040,0011)	
>Scheduled Action Item Code Sequence	(0040,0008)	
>>Code Value	(0008,0100)	
>>Coding Scheme Designator	(0008,0102)	
>>Coding Scheme Version	(0008,0103)	
>>Coding Meaning	(0008,0104)	
>Pre-Medication	(0040,0012)	
>Scheduled Procedure Step ID	(0040,0009)	
>Requested Contrast Agent	(0032,1070)	

Requested Procedure Module		
Requested Procedure ID	(0040,1001)	
Requested Procedure Description	(0032,1060)	
Requested Procedure Code Sequence	(0032,1064)	
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0102)	
>Coding Scheme Version	(0008,0103)	
>Coding Meaning	(0008,0104)	
Study Instance UID	(0020,000D)	
Referenced Study Sequence	(0008,1110)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Requested Procedure Comments	(0040,1400)	Requested Procedure Comments
Names of Intended Recipients of Results	(0040,1010)	Names of Intended Recipients of Results
Requesting Service	(0032,1033)	Requesting Service
Imaging Service Request Module		
Accession Number	(0008,0050)	Used as Query Criteria
Requesting Physician	(0032,1032)	This attribute or (0008,0090) is used as Referring Physician in the Patient Registration Screen.
Referring Physician's Name	(0008,0090)	
Imaging Service Request Comments	(0040,2400)	
Referred Patient Sequence	(0008,1120)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	

Patient Identification Module		
Patient's Name	(0010,0010)	Used as Query Criteria.
Patient ID	(0010,0020)	A response with data is expected from the MWL server. Used as Query Criteria
Other Patient IDs	(0010,1000)	
Visit Identification Module		
Current Patient Location	(0038,0300)	
Patient Demographic Module		
Patient Birth Date	(0010,0030)	
Patient Sex	(0010,0040)	
Ethnic Group	(0010,2160)	
Patient Comment	(0010,4000)	
Patient Medical Module		
Pregnancy Status	(0010,21C0)	
Medical Alerts	(0010,2000)	
Additional Patient History	(0010,21B0)	

4.2.4.7. Manual and Automatic request of patients list

The operator requests the patient information from the MWL Management server according to user-defined search criteria.

The operator retrieves the patient information list with Scheduled Procedure Step information.

The following data fields will be populated on the patient screen if available from the MWL server:

Table 14 - MWL attributes used during the Patient Registration process

Attribute Name	Tag
Patients Full Name	(0010,0010)
Patient ID	(0010,0020)
Accession Number	(0008,0050)

Date of Birth	(0010,0030)
Patient Sex	(0010,0040)
Referring Physician	(0008,0090)
Remarks (Patient Comments)	(0010,4000)
Requesting Physician	(0032,1032) or (0008,0090)*
Scheduled Procedure	(0040,0007) or (0032,1060)*
Medical Alerts	(0010,2000)

(*) Configurable via internal software key.

If more than maximum (configurable) matching records are found in the query, the user will be prompted to limit the search by entering additional search criteria.

4.2.4.8. Automatic or manual transfer of study results

The study results are automatically transferred upon registration of a new patient.

The user is prompted to define the last examined patient status (i.e. discontinued/in progress/completed) upon logging off the system.

In case a patient is examined in split sessions, the relevant study results are transferred upon completion of the full examination.

The system will attempt to send all pending commands to the MPPS server upon logging on the system.

The commands are placed on a queue and executed in the background.

4.2.4.9. Response Status

MWL-SCU will behave as described in the table below:

Table 15 - MWL-SCU Response Status Values

Service Status	Further Meaning	Status Codes	Behavior
Failure	Refused: Out of Resources	A7xx	The user is notified and the failure is logged
	Error: Identifier does not match SOP Class	A9xx	The user is notified and the failure is logged
	Error: Unable to Process	Cxxx	The user is notified and the failure is logged
Pending	Matches are continuing	FF00	The user is notified
	Matches are continuing – Warning: one or more Optional Keys were not supported	FF01	The user is notified
Success	Matching is complete	0000	The SCP has successfully returned all matching information

4.2.5. Real-World Activity – MPPS-SCU

This operation enables the AE to create an instance of the Modality Performed Procedure step SOP Class (MPPS) and provide information about a specific real word Performed Procedure step that is under control of the SCU. This operation is invoked through the DIMSE N-CREATE and N-SET services.

4.2.5.1. Starting a Performed Procedure Step

The user registers a “New Patient” at the start of each new patient examination. When a new patient examination starts, a PPS (Performed Procedure Step) instance is created and automatically transferred to a remote DICOM device. This instance will be created using the N-CREATE DIMSE service for the selected scheduled procedure.

4.2.5.2. Ending a Performed Procedure Step

When the user selects either “Completed” or “Discontinued” from the PPS User Interface, the performed procedure step will be closed using the N-SET DIMSE service. Once this event has been sent, no more images will be transferred referencing the schedule procedure.

4.2.5.3. System Shutdown

If the user selects the “System Logoff” option and there is an opened performed procedure steps, the PPS User Interface will prompt the user to close it. The opened procedure steps must be closed before the system can be shutdown.

4.2.5.4. Error handling

If at any time the MPPS is unavailable, the “Queue Manager” icon will be lit, thus indicating the user that there are pending commands to be sent to the server.

No automatic data transfer will be attempted, and user’s intervention will be necessary in order to transfer the pending commands to the server.

4.2.5.5. Proposed Presentation Context

The system will use the Presentation Context shown in the following table.

Table 16 - Modality Performed Procedure Step Presentation Context Table

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.2-7	See Table 4.2-7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

4.2.5.6. Specific Conformance - MPPS

The system AE operation involves the following sequence of steps for examination results transfer:

1. Association establishment
2. Data transfer
3. Association release

The system AE judges that the transfer of examination results was successful when the result of step (2) above is “success”, even if the result of step (3) is “failure”.

4.2.5.7. AE Title/Presentation Address Mapping

This mapping is defined during the system installation procedure.

Both the local and remote names can be arbitrary defined.

4.2.5.8. Specific Conformance to Modality Performed Procedure Step SOP Classes

The Modality Performed Procedure Step AE provides conformance to the following DICOM Service SOP Classes as an SCU all at a standard extended level of conformance.

Table 17 - SOP Classes for MPPS-SCU AE

SOP Class Name	SOP Class UID	SCU	SCP
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Yes	No

4.2.5.9. Modality Performed Procedure Step SOP Class Information Object Definition

The following table provides the list of attributes supported by the AE in the implementation of the N-CREATE and N-SET commands.

The usage of most of the listed attributes depends on an internal software key that may be configured by the Installation/Service Engineer.

Table 18 - Attributes of the N-CREATE command

Attribute Name	Tag	Notes
SOP Common Module		
Specific Character Set	(0008,0005)	Support of Character Sets
Performed Procedure Step Relationship Module		
Scheduled Step Attributes Sequence	(0040,0270)	
>Study Instance UID	(0020,000D)	From the MWL server or internally generated by the system.
>Referenced Study Sequence	(0008,1110)	
>>Referenced SOP Class UID	(0008,1150)	
>>Referenced SOP Instance UID	(0008,1155)	
>Accession Number	(0008,0050)	From the MWL server or internally generated by the system.
>Requested Procedure ID	(0040,1001)	
>Requested Procedure Description	(0032,1060)	
>Scheduled Procedure Step ID	(0040,0009)	From the MWL server or internally generated by the system
>Scheduled Procedure Step Description	(0040,0007)	
>Scheduled Action Item Code Sequence	(0040,0008)	
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0102)	
>Coding Scheme Version	(0008,0103)	
>Coding Meaning	(0008,0104)	
Patient's Name	(0010,0010)	

Patient ID	(0010,0020)	From the system Patient Registration Screen.
Patient's Birth Date	(0010,0030)	From the system Patient Registration Screen.
Patient's Sex	(0010,0040)	From the system Patient Registration Screen.
Referenced Patients Sequence	(0008,1120)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced Instance UID	(0008,1155)	
Performed Procedure Step ID	(0040,0253)	From Scheduled Procedure Step ID
Performed Station AE Title	(0040,0241)	
Performed Station Name	(0040,0242)	
Performed Location	(0040,0243)	
Performed Procedure Step Start Date	(0040,0244)	
Performed Procedure Step Time	(0040,0245)	
Performed Procedure Step Status	(0040,0252)	IN PROGRESS
Performed Procedure Step Description	(0040,0254)	From the system Patient Registration Screen.
Performed Procedure Type Description	(0040,0255)	Study Type in the system.
Procedure Code Sequence	(0008,1032)	
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0102)	
>Coding Scheme Version	(0008,0103)	
>Coding Meaning	(0008,0104)	
Performed Procedure Step End Date	(0040,0250)	Always NULL.

Performed Procedure Step End Time	(0040,0251)	Always NULL.
Image Acquisition Results Module		
Modality	(0008,0060)	From MWL or according to the system Study Type.
Study ID	((0020,0010)	Always NULL.
Performed Action Item Code Sequence	(0040,0260)	Always NULL.
Performed series sequence	(0040,0340)	Always NULL.

Table 19 - Attributes of the N-SET command

Attribute Name	Tag	Notes
Performed Procedure Step Module		
Performed Procedure Step Status	(0040,0252)	DISCONTINUED COMPLETED IN PROGRESS
Performed Procedure Step Description	(0040,0254)	From the system Patient Registration Screen.
Performed Procedure Type Description	(0040,0255)	Study Type in the system.
Procedure Code Sequence	(0008,1032)	
>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0102)	
>Coding Scheme Version	(0008,0103)	
>Coding Meaning	(0008,0104)	
Performed Procedure Step End Date	(0040,0250)	
Performed Procedure Step End Time	(0040,0251)	
Image Acquisition Results Module		
Performed Action Item Code Sequence	(0040,0260)	

>Code Value	(0008,0100)	
>Coding Scheme Designator	(0008,0102)	
Performed Series Sequence	(0040,0340)	
>Performing Physician's Name	(0008,1050)	
>Protocol Name	(0018,1030)	Study Name in the system.
>Operators Name	(0008,1070)	From Patient Registration screen. May be edited by the user.
>Series Instance UID	(0020,000E)	Internally Generated by the system.
>Series Description	(0008,103E)	Series label.
>Retrieve AE Title	(0008,0054)	Always NULL.
>Referenced Image Sequence	(0008,1140)	
>>Referenced SOP Class UID	(0008,1150)	
>>Referenced SOP Instance UID	(0008,1155)	
>Referenced Standalone SOP Instance Sequence	(0040,0220)	Always NULL.
Radiation Dose Module		
Total Time Of Fluoroscopy	(0040,0300)	Sent if available from X-ray Generator via RS-232 interface. Will not be sent if no RS-232 communication is available.
Total Number Of Exposures	(0040,0301)	
Distance Source To Detector (SID)	(0018,1110)	Sent if available from X-ray Generator via RS-232 interface. Will not be sent if no RS-232 communication is available.

4.2.6. Real-World Activity – StoreComm-SCU

4.2.6.1. Associated Real-World Activities

After images are being transferred to one predefined and unique DICOM Store SCP, the system establishes an association with a Storage Commitment SCP which is collaborated with the above Store SCP.

4.2.6.2. Proposed Presentation Context

The system will use the Presentation Context shown in the following table.

Table 20 - Storage Commitment Push Model Presentation Context Table

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.2-7	See Table 4.2-7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

4.2.6.3. Specific Conformance – Storage Commitment

Table 21 - SOP Classes for StorComm-SCU AE

SOP Class Name	SOP Class UID	SCU	SCP
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	No

The system AE operation involves the following sequence of steps for safe keeping requests transfer:

1. Association establishment
2. Data transfer
3. Association release

The system AE judges that the transfer of examination results was successful when the result of step (2) above is “success”, even if the result of step (3) is “failure”.

4.2.6.4. Storage Commitment Push Model SOP Class Information Object Definition

The following table provides the list of attributes supported by the AE in the implementation of the N-ACTION and N-EVENT-REPORT commands.

Table 22 - Attributes of the N-ACTION command

Attribute Name	Tag	Notes
Transaction UID	(0008,1195)	Generated by the system
Referenced SOP sequence	(0008,1199)	List of SOP Instance UID of images - ACTION TYPE ID is 1
> Referenced SOP Class UID	(0008,1150)	
> Referenced SOP Instance UID	(0008,1155)	
Referenced Study Component sequence	(0008,1111)	SOP Instance UID of MPPS
> Referenced SOP Class UID	(0008,1150)	
> Referenced SOP Instance UID	(0008,1155)	

Table 23 - Attributes of the N-EVENT-REPORT command

Attribute Name	Tag	Notes
Transaction UID	(0008,1195)	Generated by the system
Referenced SOP sequence	(0008,1199)	EVENT TYPE ID is 1 or 2
> Referenced SOP Class UID	(0008,1150)	
> Referenced SOP Instance UID	(0008,1155)	
Failed SOP sequence	(0008,1198)	EVENT TYPE ID is 2
> Referenced SOP Class UID	(0008,1150)	
> Referenced SOP Instance UID	(0008,1155)	
> Failure Reason	(0008,1197)	

4.2.7. Real-World Activity - Print (SCU)

The system can be configured to automatically send the images at the end of the examination. In this case, when the user selects “New Patient”, an association is opened and all acquired images are transferred. After all images are transferred, the association is closed.

The user can manually send selected images at any time. An association is opened and all selected images are transferred. After all images are transferred, the association is closed.

4.2.7.1. Associated Real-World Activities

An association is established when the user initiates a “Print” operation.

Individual images or entire examinations can be transferred to the DICOM - compliant device. The association is opened when the first selected image is transferred and closed when the last image transfer is completed. In case an error occurs during the printing process, the operator can manually attempt to resend the film at a later stage.

4.2.7.2. Proposed Presentation Context

The system will use the Presentation Context shown in the following table:

Table 24 - Print Presentation Context Table

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
See Table 4.2-7	See Table 4.2-7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None
		Explicit VR Big Endian	1.2.840.10008.1.2.2	SCU	None

4.2.7.3. Specific Conformance to Basic Grayscale Print Management Meta SOP Class

The Print AE provides standard conformance of the Grayscale Meta SOP class as an SCU. Specifically, with respect to the Basic Grayscale Print Management Meta SOP Class, this means conformance to the underlying SOP classes:

Table 25 - SOP Classes for PRINT-SCU AE

SOP Class Name	SOP Class UID	SCU	SCP
Basic Film Session SOP Class	1.2.840.100008.5.1.1.1	Yes	No
Basic Film Box SOP Class	1.2.840.100008.5.1.1.2	Yes	No
Basic Grayscale Image Box SOP Class	1.2.840.100008.5.1.1.4	Yes	No
Printer SOP Class	1.2.840.100008.5.1.1.16	Yes	No

The system provides standard conformance to the DICOM V3.0 Verification Service Class as an SCU for the Verification Class, UID = 1.2.840.10008.1.1.

4.2.7.4. Specific Conformance - Print

The system AE operation involves the following sequence of steps for each film print:

1. N – GET (Printer SOP Instance)
2. N – CREATE (Film Session SOP Instance)
- ③ The command is sent only once.
- ③ A response without any data but with the status SUCCESS is expected.
3. N – CREATE (Presentation LUT SOP Instance).
4. N – CREATE (Film Box SOP Instance)
- ③ The command is sent only once.
- ③ A response with status SUCCESS is expected from the SCP containing the following items:
 - a. (2110,0510) Referenced Image Box Sequence
 - b. >(0008,1150) SOP Class UID (Ignored by SCU)
 - c. >(0008,1155) SOP Instance UID
- ③ The received SOP Instance UIDs are stored in an array and later used when sending individual images.
5. N – SET (Grayscale Image Box SOP Instance)
- ③ The command is sent once for each image on the film.
- ③ A response without any data but with the status SUCCE is expected.
6. N – ACTION (Film Box SOP Instance)
- ③ The command is transmitted to the SCP without any data but indicating that the PRINT operation is to be performed. The command is sent only once.
- ③ A response without any data but with status SUCCESS is expected.
7. N-DELETE
- ③ Deletes the Film Session. Issued after the session is completed.

The following tables use a number of abbreviations.

- A Attribute always sent with value not editable.
- C Attribute sent with value set in the configuration screen.
- U Attribute sent with value set by user.

4.2.7.5. Specific Conformance to Basic Film Session SOP Class

Table 26 -Supported Basic Film Session SOP Class Elements

Attribute Name	Tag	Usage1	Range	Description
Number of Copies	(2000,0010)	U	1-99	Number of requested film copies
Print Priority	(2000,0020)	C	HIGH, MED, LOW	Set at configuration.
Medium Type	(2000,0030)	U	CLEAR FILM BLUE FILM PAPER	Media used for hardcopy.
Film Destination	(2000,0040)	U	MAGAZINE PROCESSOR	
Film Session Label	(2000,0050)	A	Always sent as NULL	

4.2.7.6. Specific Conformance to Basic Film Box SOP Class

Table 27 - Optional Attributes set for the Basic Film Box SOP Class

Attribute Name	Tag	Usage1	Range	Description
Image Display Format	(2010,0010)	U	STANDARD/C,R C,R=1-5	film contains equal size rectangular image boxes with R rows of image boxes and C columns of image boxes; C and R are integers.
Referenced Film Session Sequence	(2010,0500)	A		
>Referenced SOP Class UID	(0008,1150)	A		
>Referenced SOP Instance UID	(0008,1155)	A		
Film Orientation	(2010,0040)	U	LANDSCAPE PORTRAIT	

Film Size ID	(2010,0050)	U	8INX10IN 8.5INX11IN 10INX12IN 10INX14IN 11INX14IN 11INX17IN 14INX14IN 14INX17IN 24CMX24C 24CMX30CM	
Magnification Type	(2010,0060)	U	REPLICATE BILINEAR CUBIC NONE	
Max Density	(2010,0130)	U	1.5 - 3.2	Printer Specific
Smoothing Type	(2010,0080)	U	Value set at installation.	Printer Specific. Sent only in CUBIC magnification.
Border Density	(2010,0100)	U	BLACK WHITE i	Where "i" represents the desired image density in tenths of OD.
Empty Image Density	(2010,0110)	U	BLACK WHITE i	Where "i" represents the desired image density in tenths of OD
Min Density	(2010,0120)	U	0-1	Printer specific
Trim	(2010,0140)	U	YES NO	
Configuration Information	(2010,0150)	U	Value set at installation.	Printer Specific

4.2.7.7. Specific Conformance to Basic Grayscale Image SOP Class

Table 28 - Optional Attributes set for the Basic Grayscale Image Box SOP Class

Attribute Name	Tag	Usage1	Range	Description
Image Position	(2020,0010)	A	1 – N	Depends on the Image Display format chosen.
Basic Grayscale Image Sequence	(2020,0110)	A		
>Samples Per Pixel	(0028,0002)	A	Set to 1	
>Photometric Interpretation	(0028,0004)	A	Monochrome 2	
>Rows	(0028,0010)	A	Set to 1024,1536 2048,2560,3072	
>Columns	(0028,0011)	C	Set to 1024,1536 2048,2560,3072	Additional margins are selectable via internal software keys
>Pixel Aspect Ratio	(0028,0034)	A	Set to 1\1	
>Bits Allocated	(0028,0100)	A	Set to 8	
>Bits Stored	(0028,0101)	A	Set to 8	
>High Bit	(0028,0102)	A	Set to 7	
>Pixel Representation	(0028,0103)	A	Set to 0000H	
>Pixel Data	(7FE0,0010)	A		
Polarity	(2020,0020)	A	Set to NORMAL	
Magnification Type	(2010,0060)	U	REPLICATE BILINEAR CUBIC NONE	
Smoothing Type	(2010,0080)	U	Value set at installation.	Printer Specific. Same value as in FILM BOX.
Configuration Information	(2010,0150)	U	Value set at installation.	Printer Specific. Same value as in FILM BOX.

Table 29 - Supported SOP Class Elements

Attribute Name	Tag	Description
Printer Status	(2110,0010)	The behavior depends on the returned value: NORMAL: Association goes on. WARNING: Association goes on. FAILURE: Association is aborted.
Printer Status Info	(2110,0020)	Printer shall return error message. Error is displayed on the system's Printer Queue.
Printer Name	(2110,0030)	Printer shall return value.
Manufacturer	(0008,0070)	Printer shall return value.
Manufacturer Model Name	(0008,1090)	Printer shall return value.
Device Serial Number	(0018,1000)	Printer shall return value.
Software Versions	(0018,1020)	Printer shall return value.
Date of Last Calibration	(0018,1200)	Printer shall return value.
Time of Last Calibration	(0018,1201)	Printer shall return value

4.3. Network Interfaces

4.3.1. Physical Network Interface

The system is indifferent to the physical medium over which TCP/IP executes; which is dependent on the underlying operating system and hardware.

- ④ IEEE 802.3 10BASE-TX.
- ④ IEEE 802.3 100BASE-TX.
- ④ IEEE 802.3 1000BASE-X.

4.3.2. Additional Protocols

No additional protocols are supported.

4.3.3. IPv4 and IPv6 Support

This product supports only IPv4.

4.4. Configuration

A FSE can configure specific system configuration and DICOM information via DICOM Configuration application. This application is intended to be used by CMT Customer Support Engineers or administrator only.

4.4.1. AE Title/Presentation Address Mapping

A FSE can configure AE Titles, IP addresses and port numbers via the DICOM Network application. No Default AE Titles are provided; the AE Titles must be configured during installation.

Both the local and remote names can be arbitrary defined.

4.4.2. Parameters

The system networking and DICOM parameters can be configured through the system's DICOM Configuration screen (available to the Service Engineer only) and the set-up menus (available to both, the Service Engineer and the User). The following configuration is supported:

- Basic System Configuration
- DICOM Store.
- DICOM Print.
- DICOM MWL.
- DICOM MPPS.
- DICOM Storage Commitment.
- RDSR (Radiation Does Structured Report)
- Study types.

Table 30 - Configuration Parameters Table

Parameter	Configurable	Default Value	Comments
General Parameters			
Maximum PDU size the AE can receive	No	256 KB	
Maximum PDU size the AE can send	No	256 KB	
Time-out waiting for acceptance or rejection Response to an Association Open Request.	Yes	60	
Port Number	Yes	None	For receiving N-EVENT-REPORT in a different association via port 104).
Called AET	Yes	None	Per service: ADR_<Service>_SCU
Calling AET	Yes	None	
Printer\Remote DICOM device displayed name	Yes	None	
Basic System Configuration			
Station Name	Yes	None	Scheduled Station Name, DICOM tag (0040,0010)

Parameter	Configurable	Default Value	Comments
Station Location	Yes	None	Scheduled Procedure Step Location DICOM tag (0040,0011).
Storage Commitment			
Called AET	Yes	ADR_Storage Commitment _SCU	
Number of Remote Servers	Yes	None	up to 10
Local SCP AET	Yes	None	
Printers			
Called AET	Yes	ADR_Printer_SCU	
Number of Printers.	Yes	None	up to 10

5. Media Interchange

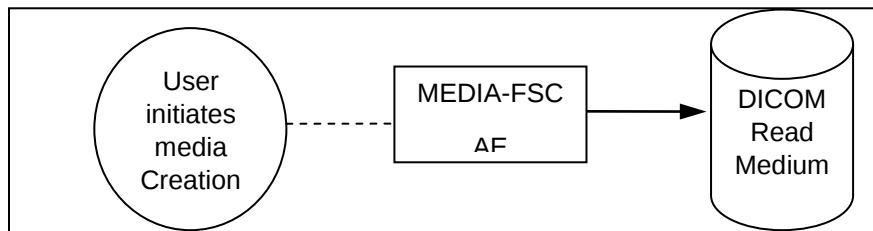
5.1. Implementation Model

5.1.1. Application Data Flow Diagram

As part of the implementation model, an application data flow diagram is included.

The next figure shows the media interchange application data flow as a functional overview of the Media AE for both DICOM CD and DVD.

Figure 2 - Application Data Flow Diagram



The application provides a user interface and media support as File Set Creator. The Media AE acts as MEDIA-FSR, when reading the directory of the medium.

Note

The Media AE provides a means to import the system DICOM data using DICOM standard PS 3.10. DICOM data can be read via CR-R or DVD drive. This feature is provided as a matter for convenience for users to move images from one system to another via CD or DVD.

5.1.2. Sequencing of Real World Activities

FSC activity is sequentially initiated in the user interface, and another activity may not be initiated until the prior activity has completed.

5.2. AE Specifications

5.2.1. MEDIA-FSC Specification

MEDIA-FSC provides standard conformance to the Media Storage Service Class.

Table 31 - AE Related Application Profiles, Real-World Activities, and Roles

Supported Application Profile	Real-World Activity	Roles
STD-GEN-CD	Create Images	FSC
STD-GEN-DVD-RAM	Create Images	FSC

5.2.1. Real-World Activities

5.2.1.1. Activity - Media Create

MEDIA-FSC is activated through the user interface when a user selects the images for burning and presses the dedicated button or menu option for burning images on CD-R.

5.2.1.1.1. Media storage application profile

As depicted in Table 5.2-1, the MEDIA-FSC AE supports the RWA Read Images for the Application Profile.

5.2.1.1.2. Options

The MEDIA-FSC Application Entity supports the SOP Classes and Transfer Syntaxes listed in the Table below:

Table 32 - IODS, SOP Classes and Transfer Syntaxes for Offline Media

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1
SC Image Storage	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian	1.2.840.10008.1.2.1
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Explicit VR Little Endian	1.2.840.10008.1.2.1
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Explicit VR Little Endian	1.2.840.10008.1.2.1
X-Ray Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.67	Explicit VR Little Endian	1.2.840.10008.1.2.1

5.3. Augmented and Private Application Profiles

The system does not support any augmented or private application profiles.

5.4. MEDIA Configuration

There is not specialized configuration for Media Interchange.

5.5. Specific Conformance - Media storage AE

All specific conformance to image IODs is the same as in STORE-SCU AE specific conformance.

6. Support of Character Sets

The system supports the following DICOM character repertoire:

- ISO-IR 6 (English)
- ISO-IR 100 (Western Europe)
- ISO-IR 87 (Japanese)
- ISO-IR 13 (Japanese)
- GB18030(Chinese)
- ISO-IR 144(Russian)

7. Security

The DICOM capabilities of the system do not support any specific security measures. It is assumed that the system is used within a secured environment.

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

7.1. Security Profiles

None supported.

7.2. Association level security

None supported.

7.3. Application level security

None supported.

8. Annexes

8.1. IOD CONTENTS

The following tables use a number of abbreviations.

VNAP	Attribute is always present and its Value is Not Always Present (attribute sent zero length if no value is present)
ANAP	Attribute Not Always Present
ALWAYS	Always Present
EMPTY	Attribute is sent without a value (attribute sent zero length)

The abbreviations used in the “Source” column:

USER	the attribute value source is from User input
AUTO	the attribute value is generated automatically
CONFIG	the attribute value source is a configurable parameter
MWL	the attribute value source is from MWL

Note

All dates and times are encoded in the local configured calendar and time.

8.1.1. SC Image IOD Modules

The tables below are specified the attributes of an SC Image transmitted by the system storage application.

The following tables give a detailed overview of all supported attributes of the supported storage SOP Class. In addition, SR template forms present the top of a content tree for questionnaire reports generated by the system.

Table 33 - SC Image IOD Modules

IE	Module	Reference	Usage
Patient	Patient	Table 37	ALWAYS
Study	General Study	Table 38	ALWAYS
Series	General Series	Table 39	ALWAYS
Equipment	General Equipment	Table 40	ALWAYS
	SC Equipment	Table 41	ALWAYS
Image	General Image	Table 42	ALWAYS
	Image Pixel	Table 43	ALWAYS
	SC Image	Table 44	ALWAYS
	VOI LUT	Table 45	ALWAYS
	SOP Common	Table 46	ALWAYS

Table 34 - XA ANGIOGRAPHIC IOD Modules

IE	Module	Reference	Usage
Patient	Patient	Table 37	ALWAYS
Study	General Study	Table 38	ALWAYS
Series	General Series	Table 39	ALWAYS
Equipment	General Equipment	Table 47	ALWAYS
Image	General Image	Table 42	ALWAYS
	Image Pixel	Table 43	ALWAYS
	Display Shutter	Table 48	ALWAYS
	X-Ray Image	Table 49	ALWAYS
	X-Ray Acquisition	Table 50	ALWAYS
	X-Ray Collimator	Table 51	ALWAYS
	XR Positioner	Table 52	ALWAYS
	VOI LUT	Table 45	ALWAYS
	SOP Common	Table 46	ALWAYS

Table 35 - XRF Image IOD Modules

IE	Module	Reference	Usage
Patient	Patient	Table 37	ALWAYS
Study	General Study	Table 38	ALWAYS
Series	General Series	Table 39	ALWAYS
Equipment	General Equipment	Table 47	ALWAYS
Image	General Image	Table 42	ALWAYS
	Image Pixel	Table 43	ALWAYS
	Display Shutter	Table 48	ALWAYS
	X-Ray Image	Table 49	ALWAYS
	X-Ray Acquisition	Table 50	ALWAYS
	X-Ray Collimator	Table 51	ALWAYS
	XRF Positioner	Table 53	ALWAYS
	VOI LUT	Table 45	ALWAYS
	SOP Common	Table 46	ALWAYS

Table 36 - CR Image IOD Modules

IE	Module	Reference	Usage
Patient	Patient	Table 37	ALWAYS
Study	General Study	Table 38	ALWAYS
Series	General Series	Table 39	ALWAYS
	CR Series	Table 55	ALWAYS
Equipment	General Equipment	Table 48	ALWAYS
Exposure Index	Exposure Index	Table 57	ALWAYS
Image	General Image	Table 42	ALWAYS
	Image Pixel	Table 43	ALWAYS
	CR Image	Table 56	ALWAYS
	SOP Common	Table 46	ALWAYS

Table 37 - Patient Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Patient's Name	(0010,0010)	PN	User input. Value is set to NULL if no patient name is specified.	ALWAYS	USER
Patient ID	(0010,0020)	LO	User input. Value is set to NULL if no patient name is specified.	ALWAYS	USER
Patient's Birth Date	(0010,0030)	DA	User input. Value is set to NULL if no patient name is specified.	ALWAYS	USER
Patient's Sex	(0010,0040)	CS	User input. Value is set to NULL if no patient name is specified.	ALWAYS	USER
Referenced Patient Sequence	(0008,1120)	SQ	MWL input.	ANAP	MWL
>Referenced SOP Class UID	(0008,1150)	UI	MWL input.	ANAP	MWL
>Referenced Instance UID	(0008,1155)	UI	MWL input.	ANAP	MWL
Patient Comments	(0010,4000)	LT	MWL input.	ANAP	MWL

Table 38 - General Study Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Study Instance UID	(0020,000D)	UI	Generated by device or MWL	ALWAYS	AUTO or MWL
Study Date	(0008,0020)	DA	Generated by device (yyyymmdd)	ALWAYS	AUTO
Study Time	(0008,0030)	TM	Generated by device, (hhmmss)	ALWAYS	AUTO
Referring Physician's Name	(0008,0090)	PN	User input. Editable by the user	ALWAYS	USER
Study ID	(0020,0010)	SH	User input	ALWAYS	USER
Accession Number	(0008,0050)	SH	MWL input	ANAP	MWL
Referenced Study Sequence	(0008,1110)	SQ	MWL input	ANAP	MWL
>Referenced SOP Class UID	(0008,1150)	UI	MWL input	ANAP	MWL
>Referenced SOP Instance UID	(0008,1155)	UI	MWL input	ANAP	MWL

Table 39 - General Series Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	(0008,0060)	CS	The modality value is changed according to created SOP instance: CR - Computed Radiography, SC - Secondary Capture, XA - X-Ray and RF - XRF	ALWAYS	AUTO
Performing Physicians' Name	(0008,1050)	PN	User input. Editable by the user	ALWAYS	USER
Series Instance UID	(0020,000E)	UI	Generated by device	ALWAYS	AUTO
Series Number	(0020,0011)	IS	Generated by device	ALWAYS	AUTO
Series Date	(0008,0021)	DA	Generated by device (yyyymmdd)	ALWAYS	AUTO
Series Time	(0008,0031)	TM	Generated by device, (hhmmss)	ALWAYS	AUTO
Operators Name	(0008,1070)	PN	User input. Editable by the user	ALWAYS	USER
Protocol Name	(0018,1030)	LO	User input. Editable by the user	ALWAYS	USER
Series Description	(0008,103E)	LO	User input (system study name)	ALWAYS	USER
Body Part Examined	(0018,0015)	CS	User input. Editable by the user Series label.	ALWAYS	USER
Requested Attributes Sequence	(0040,0275)	SQ	User input. Editable by the user Value is set to NULL if no body part is specified.	ALWAYS	USER
> Requested Procedure ID	(0040,1001)	SH	Sent if the tag is received from the MWL server. This information is present only if the MWL service is enabled.	ANAP	MWL
>Scheduled Procedure Step ID	(0040,0009)	SH	Sent if the tag is received from the MWL server. This information is present only if the MWL service is enabled.	ANAP	MWL

>Scheduled Procedure Step Description	(0040,0007)	LO	Sent if the tag is received from the MWL server. This information is present only if the MWL service is enabled.	ANAP	MWL
>Scheduled Action Item Code Sequence	(0040,0008)	SQ	Sent if the tag is received from the MWL server. This information is present only if the MWL service is enabled.	ANAP	MWL
>>Code Value	(0008,0100)	SH	Sent if the tag is received from the MWL server. This information is present only if the MWL service is enabled.	ANAP	MWL
>>Coding Scheme Designator	(0008,0102)	SH	Sent if the tag is received from the MWL server. This information is present only if the MWL service is enabled.	ANAP	MWL
>>Coding Scheme Version	(0008,0103)	SH	Sent if the tag is received from the MWL server. This information is present only if the MWL service is enabled.	ANAP	MWL
>>Coding Meaning	(0008,0104)	LO	Sent if the tag is received from the MWL server. This information is present only if the MWL service is enabled.	ANAP	MWL
Performed Procedure Step ID	(0040,0253)	SH	User input. Editable by the user	ALWAYS	USER
Performed Procedure Step Start Date	(0040,0244)	DA	Generated by device (yyyymmdd)	ANAP	AUTO
Performed Procedure Step Start Time	(0040,0245)	TM	Generated by device, (hhmmss)	ANAP	AUTO
Performed Procedure Step Description	(0040,0254)	LO	User input. Editable by the user	ALWAYS	USER
Performed Action Item Code Sequence	(0040,0260)	SQ	Zero length	EMPTY	AUTO

Table 40 – SC General Equipment Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	(0008,0070)	LO	CMT	ALWAYS	AUTO
Institution Name	(0008,0080)	LO	Generated by device, Hospital Name (for each image)	ALWAYS	CONFIG
Institution Address	(0008,0081)	ST	Generated by device, address of the institution.	ALWAYS	MWL
Institutional Department Name	(0008,1040)	ST	Generated by device, Department in the institution.	ALWAYS	MWL
Software Version	(0018,1020)	LO	Generated by device	ALWAYS	AUTO
Station Name	(0008,1010)	SH	From Configuration Utility (name + location).	ALWAYS	CONFIG
Manufacturer's Model Name	(0008,1090)	LO	Name displayed on the system's welcome screen.	ALWAYS	CONFIG
Device Serial Number	(0018,1000)	LO	Serial no. of the system.	ALWAYS	CONFIG
Conversion Type	(0008,0064)	CS	Set to DI	ALWAYS	CONFIG

Table 41 - SC Equipment Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Conversion Type	(0008,0064)	CS	Set to DI	ALWAYS	AUTO
Modality	(0008,0060)	CS	SC	ALWAYS	AUTO

Table 42 - General Image Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Instance Number	(0020,0013)	IS	Generated by device	ALWAYS	AUTO
Patient Orientation	(0020,0020)	CS	Zero length	EMPTY	AUTO
Content Date	(0008,0023)	DA	Generated by device (yyyymmdd)	ALWAYS	AUTO
Content Time	(0008,0033)	TM	Generated by device, (hhmmss)	ALWAYS	AUTO
Image Type	(0008,0008)	CS	Always DERIVED, SECONDARY and SINGLE PLANE	ALWAYS	AUTO
Image Comments	(0020,4000)	LT	User Input	ALWAYS	USER
Burned in Annotation	(0028,0301)	CS	YES or NOT, depending on whether the relevant option was selected via the system's DICOM setup menu.	ALWAYS	CONFIG
Lossy Image Compression	(0028,2110)	CS	Set to 00.	ALWAYS	CONFIG

Table 43 - Image Pixel Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Samples Per Pixel	(0028,0002)	US	1	ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS	Monochrome 2	ALWAYS	AUTO
Row	(0028,0010)	US	Set to 1024, 1536, 2048, 2560, ,3072	ALWAYS	AUTO
Columns	(0028,0011)	US	Set 1024, 1536, 2048, 2560, 3072. Additional margins are configurable via internal software key	ALWAYS	AUTO
Bits Allocated	(0028,0100)	US	Set to 8 Bit for Fluoroscopy or 16 Bit for radiographic.	ALWAYS	AUTO
Bits Stored	(0028,0101)	US	Set to 8 or 10, 12, 14 or 16.	ALWAYS	AUTO
High Bit	(0028,0102)	US	Set to 7 or 9.	ALWAYS	AUTO
Pixel Representation	(0028,0103)	US	Set to 0000H.	ALWAYS	AUTO
Pixel Data	(7FE0,0010)	OB/OW		ALWAYS	AUTO

Table 44 -SC Image Module Attributes of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Date of Secondary Capture	(0018,1012)	DA	Generated by device	ALWAYS	AUTO
Time of Secondary Capture	(0018,1014)	TM	Generated by device	ALWAYS	AUTO

Table 45 - VOI LUT of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Window Center	(0028,1050)	DS	Generated by device	ALWAYS	AUTO
Window Width	(0028,1051)	DS	Generated by device	ALWAYS	AUTO

Table 46 - SOP Common Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
SOP Class UID	(0008,0016)	UI	The modality value is changed according to created SOP instance: 1.2.840.10008.5.1.4.1.1.1 - Computed Radiography, 1.2.840.10008.5.1.4.1.1.7 - Secondary Capture, 1.2.840.10008.5.1.4.1.1.12.1 - X-Ray and 1.2.840.10008.5.1.4.1.1.12.2 - XRF	ALWAYS	AUTO
SOP Instance UID	(0008,0018)	UI	Generated by device	ALWAYS	AUTO
Specific Character Set	(0008,0005)	CS	<u>Support of Character Sets</u>	ALWAYS	AUTO

Table 47 - General Equipment Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	(0008,0070)	LO	CMT	ALWAYS	AUTO
Institution Name	(0008,0080)	LO	Generated by device, Hospital Name (for each image)	ALWAYS	CONFIG
Institution Address	(0008,0081)	ST	Generated by device, address of the institution.	ALWAYS	MWL
Institutional Department Name	(0008,1040)	ST	Generated by device, Department in the institution.	ALWAYS	MWL
Software Version	(0018,1020)	LO	Generated by device	ALWAYS	AUTO
Station Name	(0008,1010)	SH	From Configuration Utility (name + location).	ALWAYS	CONFIG
Manufacturer's Model Name	(0008,1090)	LO	Name displayed on the system's welcome screen.	ALWAYS	CONFIG
Device Serial Number	(0018,1000)	LO	Serial no. of the system.	ALWAYS	CONFIG

Table 48 - XA Display Shutter Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Shutter Shape	(0018,1600)	CS	Always RECTANGULAR	ANAP	AUTO
Shutter Left Vertical Edge	(0018,1602)	IS	Generated by device	ANAP	AUTO
Shutter Right Vertical Edge	(0018,1604)	IS	Generated by device	ANAP	AUTO
Shutter Upper Horizontal Edge	(0018,1606)	IS	Generated by device	ANAP	AUTO
Shutter Lower Horizontal Edge	(0018,1608)	IS	Generated by device	ANAP	AUTO
Shutter Presentation Value	(0018,1622)	US	Always 0000H	ALWAYS	AUTO

* Used only if a shutter shape is defined when the image is created

Table 49 - X-Ray Image Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Lossy Image Compression	(0028,2110)	CS	Set to 00.	ALWAYS	CONFIG
Image Type	(0008,0008)	CS	ORIGINAL/DERIVED. PRIMARY/SECONDARY. SINGLE PLANE.	ALWAYS	AUTO
Pixel Intensity Relationship	(0028,1040)	CS	DISP/LIN.	ALWAYS	AUTO
Samples Per Pixel	(0028,0002)	US	Set to 1.	ALWAYS	AUTO
Photometric Interpretation	(0028,0004)	CS	Set to Monochrome 2.	ALWAYS	AUTO
Bits Allocated	(0028,0100)	US	Set to 8 Bit for Fluoroscopy or 16 Bit for radiographic.	ALWAYS	AUTO
Bits Stored	(0028,0101)	US	Set to 8 or 10, 12, 14 or 16.	ALWAYS	AUTO
High Bit	(0028,0102)	US	Set to 7,9,11,13,15	ALWAYS	AUTO
Pixel Representation	(0028,0103)	US	Set to 0000H.	ALWAYS	AUTO
Derivation Description	(0008,2111)	ST	Sent only if Image Type (0008,0008) is DERIVED.	ANAP	AUTO

Table 50 - X-Ray Acquisition Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
KVP	(0018,0060)	DS	Sent with value available from X-ray generator via RS-232 interface. Value will be Zero length if no communication is available.	ALWAYS	AUTO
Radiation Setting	(0018,1155)	CS	GR for radiographic images. SC for fluoroscopy images.	ALWAYS	AUTO
X Ray Tube Current	(0018,1151)	IS	Sent with value available from X-ray generator via RS-232 interface. Value will be Zero length if no communication is available.	ALWAYS	AUTO
Exposure Time	(0018,1150)	IS	Sent with value available from X-ray generator via RS-232 interface. Value will be Zero length if no communication is available.	ALWAYS	AUTO
Intensifier Size	(0018,1162)	DS	Diameter of X-ray intensifier in mm.	ALWAYS	AUTO
Field of View shape	(0018,1147)	CS	Set to RECTANGLE/ROUND.	ALWAYS	CONFIG
Image and Fluoroscopy Area Dose Product	(0018,115E)	DS	X-Ray dose, measured in dGy*cm*cm, to which the patient was exposed for the acquisition of this image	ALWAYS	AUTO

Table 51 - X-Ray Collimator Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Collimator Shape	(0018,1700)	CS	Always RECTANGULAR	ALWAYS	AUTO
Collimator Left Vertical Edge	(0018,1702)	IS	Generated by device	ANAP	AUTO
Collimator Right Vertical Edge	(0018,1704)	IS	Generated by device	ANAP	AUTO
Collimator Upper Horizontal Edge	(0018,1706)	IS	Generated by device	ANAP	AUTO

* Used only if a collimator shape is defined when the image is created

Table 52 - XA Positioner of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Distance Source to Detector	(0018,1110)	DS	Sent with value available from X-ray generator via RS-232 interface. Value will be Zero length if no communication is available.	ANAP	AUTO
Positioner Primary Angle	(0018,1510)	DS	Sent with value available from X-ray generator via RS-232 interface. Value will be Zero length if no communication is available.	ANAP	AUTO
Positioner Secondary Angle	(0018,1511)	DS	Sent with value available from X-ray generator via RS-232 interface. Value will be Zero length if no communication is available.	ANAP	AUTO

Table 53 - XRF Positioner Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Distance Source to Detector	(0018,1110)	DS	Sent with value available from X-ray generator via RS-232 interface. Value will be Zero length if no communication is available.	ANAP	AUTO

Table 54 - Enhanced General Equipment Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Manufacturer	(0008,0070)	LO	CMT	ALWAYS	AUTO
Manufacturer's Model Name	(0008,1090)	LO	System Name	ALWAYS	AUTO
Device Serial Number	(0018,1000)	LO	Serial Number	ALWAYS	AUTO
Software Versions	(0018,1020)	LO	Software Version	ALWAYS	AUTO

Table 55 - CR Series Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Body Part Examined	(0018,0015)	CS	Text description of the part of the body examined. See PS 3.16 Annexes on Correspondence of Anatomic Region Codes and Body Part Examined for Humans and for Animals for Defined Terms	ANAP	USER
View Position	(0018,5101)	CS	Always NULL	ALWAYS	AUTO
Focal Spot	(0018,1190)	DS	Size of the focal spot in mm. For devices with variable focal spot or multiple focal spots, small dimension followed by large dimension.	ANAP	AUTO

Table 56 - CR Image Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Photometric Interpretation	(0028,0004)	CS	MONOCHROME2	ALWAYS	AUTO
KVP	(0018,0060)	DS	Peak kilo voltage output of the x-ray generator used	ALWAYS	AUTO
Distance Source to Detector	(0018,1110)	DS	Distance in mm from source to detector center. Note: This value is traditionally referred to as Source Image Receptor Distance (SID).	ALWAYS	AUTO
Exposure Time	(0018,1150)	IS	Time of x-ray exposure in msec	ALWAYS	AUTO
X-Ray Tube Current	(0018,1151)	IS	X-Ray Tube Current in mA.	ALWAYS	AUTO
Exposure	(0018,1152)	IS	Time of x-ray exposure in msec	ALWAYS	AUTO
Imager Pixel Spacing	(0018,1164)	DS	Physical distance measured at the front plane of the Image Receptor housing between the center of each pixel. Specified by a numeric pair - row spacing value (delimiter) column spacing value - in mm.	ANAP	AUTO

Table 57 - Exposure Index Macro Attributes

Attribute Name	Tag	Type	Description
Exposure Index	(0018,1411)	3	Measure of the detector response to radiation in the relevant image region of an image acquired with a digital x-ray imaging system as defined in IEC 62494-1. Note 1. A string rather than binary Value Representation is used for this Attribute, in order to allow the sender to control the precision of the value as suggested in the report of AAPM Task Group 116. 2. This index value is scaled as defined by IEC 62494-1.
Target Exposure Index	(0018,1412)	3	The target value used to calculate Deviation Index (0018,1413) as defined in IEC 62494-1.
Deviation Index	(0018,1413)	3	A scaled representation of the difference of the Exposure Index compared to the Target Exposure Index as defined in IEC 62494-1 and the report of AAPM TG 116.

Table 58 - X-RAY Radiation Dose SR IOD Modules

IE	Module	Reference	Usage
Patient	Patient	Table 37	ALWAYS
Study	General Study	Table 38	ALWAYS
Series	SR Document Series	Erreur ! Source du renvoi introuvable.	ALWAYS
Equipment	General Equipment	Table 47	ALWAYS
	Enhanced General Equipment	Table 54	ALWAYS
Document	SR Document General	Table 60	ALWAYS
	SR Document Content	Table 61	ALWAYS
	SOP Common	Erreur ! Source du renvoi introuvable. 4 7	ALWAYS

Table 59 - SR Document Series Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Modality	(0008,0060)	CS	SR = SR Document	ALWAYS	AUTO
Series Instance UID	(0020,000E)	UI	Unique identifier of the Series.	ALWAYS	AUTO
Series Number	(0020,0011)	IS	Set to 1.	ALWAYS	AUTO
Referenced Performed Procedure Step Sequence	(0008,1111)	SQ	Always NULL.	ALWAYS	AUTO

Table 60 - SR Document General Module of Created SOP Instances

Attribute Name	Tag	VR	Value	Presence of Value	Source
Instance Number	(0020,0013)	IS	Set to 1	ALWAYS	AUTO
Completion Flag	(0040,A491)	CS	Set to PARTIAL.	ALWAYS	AUTO
Verification Flag	(0040,A493)	CS	Unverified	ALWAYS	AUTO
Content Date	(0008,0023)	DA	The date the document content creation started.	ALWAYS	AUTO
Content Time	(0008,0033)	TM	The time the document content creation started.	ALWAYS	AUTO
Performed Procedure Code Sequence	(0040,A372)	SQ	Set to Null	ALWAYS	AUTO

Table 61 - SR Document Content Module Attributes

Attribute Name	Tag	VR	Value	Presence of Value	Source
Value Type	(0040,A040)	CS	Set to CONTAINER	ALWAYS	AUTO
Continuity of Content	(0040,A050)	CS	Set to SEPARATE.	ALWAYS	AUTO

8.1.2. SR Template Information

Table 62 - TID 10001 Projection X-Ray Radiation Dose

NL	Rel with Parent	Concept Name	Req Type	Condition	Value Set Constraint
		EV (113701, DCM, "X-Ray Radiation Dose Report")	M		
>	HAS CONCEPT MOD	EV (121058, DCM, "Procedure reported")	M		DT (113704, DCM, "Projection X-Ray")
>>	HAS CONCEPT MOD	EV (G-C0E8, SRT, "Has Intent")	M		R-408C3 "Diagnostic Intent"
>		DTID (1002) Observer Context	M		See Table 66
>	HAS OBS CONTEXT	EV (113705, DCM, "Scope of Accumulation")	M		"Performed Procedure Step"
>>	HAS PROPERTIES	DCID (10001) UID Types	M		"Study Instance UID"
>	CONTAINS	DTID (10002) Accumulated X-Ray Dose	MC		See Table 63
>	CONTAINS	DTID (10003) Irradiation Event X-Ray Data	M		See Table 64
>	CONTAINS	EV (113854, DCM, "Source of Dose Information")	M		"Automated Data Collection"

Table 63 - TID 10002 Accumulated X-Ray Dose

NL	Rel with Parent	Concept Name	Req Type	Condition	Value Set Constraint
		EV (113702, DCM, "Accumulated X-Ray Dose Data")	M		
>	HAS CONCEPT MOD	EV (113764, DCM, "Acquisition Plane")	M		"Single Plane"
>	CONTAINS	EV (122505, DCM, "Calibration")	MC	IFF Calibration Data is available	
>>	HAS CONCEPT MOD	EV (113794, DCM, "Dose Measurement Device")	M		"Dosimeter"
>>	CONTAINS	EV (113723, DCM, "Calibration Date")	M		USER input if available or current date
>>	CONTAINS	EV (122322, DCM, "Calibration Factor")	M		USER input
>>	CONTAINS	EV (113763, DCM, "Calibration Uncertainty")	M		USER input
>>	CONTAINS	EV (113724, DCM, "Calibration Responsible Party")	M		USER input
>	CONTAINS	DTID (10004) Accumulated Projection X-Ray Dose	MC		See Table 65
>	CONTAINS	DTID (1021) Device Participant	MC		See Table 68

Table 64 - TID 10003 Irradiation Event X-Ray Data

NL	Rel with Parent	Concept Name	Req Type	Condition	Value Set Constraint
		EV (113706, DCM, "Irradiation Event X-Ray Data")	M		
>	HAS CONCEPT MOD	EV (113764, DCM, "Acquisition Plane")	M		"Single Plane"
>	CONTAINS	DT (111526, DCM, "DateTime Started")	M		AUTO
>	CONTAINS	EV (113721, DCM, "Irradiation Event Type")	M		"Fluoroscopy" / "Stationary Acquisition" / "Stepping Acquisition"
>	CONTAINS	EV (125203, DCM, "Acquisition Protocol")	U	ANAP	DR / DA/ DSA
>	CONTAINS	EV (113780, DCM, "Reference Point Definition")	MC		"Chamber Patient Distance"
>	CONTAINS	EV (113769, DCM, "Irradiation Event UID")	M		AUTO
>	CONTAINS	EV (122130, DCM, "Dose Area Product")	MC		AUTO
>	CONTAINS	EV (113738, DCM, "Dose (RP)")	MC		AUTO
>	CONTAINS	EV (113790, DCM, "Collimated Field Area")	U	ANAP	AUTO

>	CONTAINS	EV (113732, DCM, "Fluoro Mode")	UC	If Irradiation Event Type = "Fluoroscopy"	"Continuous"/ "Pulsed"/
>	CONTAINS	EV (113791, DCM, "Pulse Rate")	MC	If Fluoro Mode = "Pulsed"	AUTO
>	CONTAINS	EV (113768, DCM, "Number of Pulses")	MC	If Fluoro Mode = "Pulsed"	AUTO
>	CONTAINS	EV (113733, DCM, "KVP")	U	ANAP	AUTO
>	CONTAINS	EV (113734, DCM, "X-Ray Tube Current")	U	ANAP	AUTO
>	CONTAINS	EV (113735, DCM, "Exposure Time")	U	ANAP	AUTO
>	CONTAINS	EV (113793, DCM, "Pulse Width")	U	ANAP	AUTO
>	CONTAINS	EV (113742, DCM, "Irradiation Duration")	U	ANAP	AUTO
>	CONTAINS	EV (123014 , DCM, ("Target Region")	M		"T-D0010" "Entire body"
>	CONTAINS	EV (111635, DCM, "X-Ray Grid")	U	ANAP	"No grid"/ "Focused grid"
>	CONTAINS	DTID (1021) Device Participant	MC		See Table 68
>	CONTAINS	EV (113795, DCM, "Acquired Image")	MC	IFF Image Object is created for this irradiation event	AUTO

Table 65 - TID 10004 Accumulated Projection X-Ray Dose

NL	Rel with Parent	Concept Name	Req Type	Condition	Value Set Constraint
		EV (113722, DCM, "Dose Area Product Total")	M		AUTO
		EV (113725, DCM, "Dose (RP) Total")	MC		AUTO
		EV (113726, DCM, "Fluoro Dose Area Product Total")	MC	If Irradiation Event Type = "Fluoroscopy"	AUTO
		EV (113730, DCM, "Total Fluoro Time")	MC	If Irradiation Event Type = "Fluoroscopy"	AUTO
		EV (113727, DCM, "Acquisition Dose Area Product Total")	M		AUTO
		EV (113729, DCM, "Acquisition Dose (RP) Total")	MC		AUTO
		EV (113855, DCM, "Total Acquisition Time")	M		AUTO
		EV (113780, DCM, "Reference Point Definition")	MC		"Chamber Patient Distance"

Table 66 - TID 1002 Observer Context

NL	Rel with Parent	Concept Name	Req Type	Condition	Value Set Constraint
	Has OBS context	Observer Type			
	Has OBS context	DTID (1004) Device observer identifying attributes			See Table 67

Table 67 - TID 1004 Observer Identifying Attributes

NL	Rel with Parent	Concept Name	Req Type	Condition	Value Set Constraint
		EV (121008,DCM, "Person Observer Name")	M		
		EV (121009,DCM, " Person Observer's Organization Name")	U		Hospital Name (0008,0080)
		EV (121010,DCM, " Person Observer's Role in the Organization")	U		"Physician"
		EV (121011,DCM, " Person Observer's Role in this Procedure")	U		"Performing"

Table 68 - TID 1021 Device Participant

NL	Rel with Parent	Concept Name	Req Type	Condition	Value Set Constraint
		EV (113876, DCM, "Device Role in Procedure")	M		
	Has properties	EV (113878, DCM, "Device Manufacturer")	M		User Input
	Has properties	EV (113879, DCM, "Device Model Name")	M		User Input
	Has properties	EV (113880, DCM, "Device Serial Number")	M		User Input
	HAS PROPERTIES	EV (121012, DCM, "Device Observer UID")	M		User Input

8.1.3. Usage of Attributes from received IOD's by applications

No SOP Class attributes fields are required.

8.1.5. Attribute mapping

Not applicable.

8.1.6. Coerced/Modified Fields

Not applicable.

8.2. Data Dictionary of Private Attributes

Not applicable.

8.3. Coded terminology and templates

Not Applicable.

8.4. Grayscale Image Consistency

Not Applicable.

8.5. Standard Extended/Specialized/Private SOP Classes

Neither Standard Extended or Specialized nor Private SOP Classes are supported.

8.6. Private transfer syntaxes

No private transfer syntaxes are supported.

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