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DICOM Conformance Statement for Trinias / BRANSIST alexa

(DAR-9500f Rev.6.9 or later)

SHIMADZU

Revision History

Date	Rev.	Comment
2018.04.27	First	First Revision
2018.10.01	A	Added 6.1.19 X-ray Table Module
2019.06.12	B	Added 6.1.20 X-ray Table Position Macro Attributes Updated 6.3 RDSR
2020.02.18	C	Updated 1.2 Source of this document from 2006 to 2018 Added Storage Commitment process in Chapter 2.1. Changed chapter from 3.2.1.2 to 3.2.2 Added Key Attributes to Table 4. Updated Table 18 Change Title of Chapter 5.2. Modified the text of Chapter 5.2.2 Modified the note of Chapter 5.2.3 Remove Chapter 5.3, 5.4, 5.5, 5.6 Modified Chapter 4.3.1, 4.3.2, 6.1.13, 6.1.15, 6.1.16, 6.1.17, 6.1.20, 6.1.21, 6.2.8, 6.2.13, 6.3.6 Added Tag(0018,1160) to Additional Attributes Module Added Tag(0008,1090) to Gerenral Equipment Module Removed Tag(2050,0020) from Gerenral Image Module Removed Tag(0028,0009) from Gerenral Image Module Added Tag(0028,0009) to SC Multi-frame Image Module Added Tag(2050,0020) to SC Multi-frame Image Module Added Multiframe Grayscale Byte Secondary Capture Image Storage Added Patient's Age Tag to X-ray Angiographic Image, Scondary Capture Image, SR Modified Private Tags. Added [Referenced Performed Procedure Step Sequence] Tag to SR. Moved tags as below from Additional Attributes Module to SR Document Content Module. ・ Continuity of Content ・ Content Template Sequence ・ Mapping Resource ・ Template Identifier Added tags as below to SR Document General Module ・ Performed Procedure Code Sequence ・ Added tags as below to SR Document Content Module ・ Content Sequence ・ Relationship Type ・ Value Type Changed the title of Chapter 6.4 from 'SR' to 'X-Ray Radiation Dose SR'. Added Chapter 6.4.12, 6.4.13, 6.4.14, 0, 6.4.16, 6.4.17, 6.4.18, and 6.4.22. The description on SR content descriptions moved from 6.4.11 to Capter 6.4.12. The description on TID10001 moved from 6.4.11 to Capter 6.4.13. The description on TID1002 moved from 6.4.11 to Capter 6.4.14. The description on TID1003 moved from 6.4.11 to Capter 6.4.15. The description on TID1004 moved from 6.4.11 to Capter 6.4.16. The description on TID10002 moved from 6.4.11 to Capter 6.4.17. The description on TID10003 moved from 6.4.11 to Capter 6.4.18. The description on TID10003B moved from 6.4.11 to Capter 6.4.19 The description on TID10003B moved from 6.4.11 to Capter 6.4.20 The description on TID10003C moved from 6.4.11 to Capter 6.4.21. The description on TID10004 moved from 6.4.11 to Capter 6.4.22. The description on TID10007 moved from 6.4.11 to Capter.6.4.23
2020.08.21	D	Removed X-ray Table Position Macro Attributes Removed Frame Numbers of Interest Tag(0028,6020) Removed Frames of Interest Description Tag(0028,6022) Added DX Detector Module Added Private Tags.

Overview:

This conformance statement details the compliance to DICOM of DAR-9500 mounted in Trinias / BRANSIST alexa systems / CVS Package.

Table below provides an overview of the network services supported by DAR-9500.

NETWORK SERVICES

SOP Classes	User of Services (SCU)	Provider of Services (SCP)
Transfer		
X-ray Angiographic Image Storage	Yes	Yes
X-ray Radiation Dose SR Storage	Yes	No
Secondary Capture Image Storage SOP Class	Yes	Yes
Query/Retrieve		
Patient Root Q/R Information Model - Find	Yes	No
Patient Root Q/R Information Model - Move	Yes	No
Study Root Query/Retrieve IM Find	Yes	No
Study Root Query/Retrieve IM Move	Yes	No
Workflow Management		
Modality Worklist Information Model – Find	Yes	No
Modality Performed Procedure Step	Yes	No
Storage Commitment Push Model	Yes	No
Print Management		
Basic Grayscale Print Management Meta	Yes	No
Verification		
Verification	Yes	Yes

Table below provides an overview of the Media Storage Application Profiles supported by DAR-9500.

MEDIA SERVICES

SOP Classes	Write Files (FSC or FSU)	Read Files (FSR)
General Purpose CD-R	Yes	Yes
General Purpose DVD-R	Yes	Yes

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1. Introduction

1.1. Purpose of This Document

The purpose of this document is to describe how *DAR-9500f* conforms to the DICOM standard. It describes what parts and definition it utilizes and in what way, in order to provide interoperability with other devices that claim same conformance.

1.2. Sources for This Document

American College of Cardiology –National Manufactures Association (ACR-NEMA) Digital Imaging and Communications V2.0
ACR-NEMA Digital Imaging and Communications in Medicine (DICOM) v3.0, 2018.

1.3. Acronyms and Abbreviation

The following acronyms and abbreviations are used in this document.

- ACR American College of Radiology
- ACSE Association Control Service Element
- AE Application Entity
- ANSI American National Standards Institute
- AP Application Profile
- API Application Programming Interface
- ASCII American Standard Code for Information Interchange
- DICOM Digital Imaging and Communications in Medicine
- DIMSE DICOM Message Service Element
- DIMSE-C DICOM Message Service Element-Composite
- DIMSE-N DICOM Message Service Element-Normalized
- FSC File Set Creator
- FSR File Set Reader
- FSU File Set Updater
- GUI Graphical User Interface
- NEMA National Electrical Manufacturers Association
- PDU Protocol Data Unit
- RDSR DICOM Radiation Dose Structure Report
- RWA Real World Activity
- SCP Service Class Provider
- SCU Service Class User
- SOP Service Object Pair
- TCP/IP Transmission Control Protocol/Internet Protocol
- UID Unique Identifier
- MPPS Modality Performed Procedure Step
- PPS Performed Procedure Step
- PS Presentation State
- VM Value Multiplicity
- VR Value Representation
- VT Value Type

1.4. Note to Reader

- **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 a networked environment may require application functions that are not specified within the scope of the DICOM standard. Consequently, using only the information provided by this conformance statement does not guarantee interoperability of Shimadzu Equipment with other vendor's equipment. It is the user's responsibility to thoroughly analyze the application requirements and to specify a solution that integrates Shimadzu equipment with the projected other vendor's equipment.

- **Validation**

Although Shimadzu equipment has been completely tested to verify that the implementation of the DICOM interface for this product corresponds with this Conformance Statement, even if comparison of respective Conformance Statement indicates that successful interconnection should be possible with another vendor's equipment, additional validation will always be necessary to ensure full functionality. It is the responsibility of the user to specify the appropriate test suite and to carry out the additional validation tests.

- **Version of the DICOM standard**

Shimadzu is committed to evolve with the DICOM standard as it adapts to meet the future requirement of users and technology. In order to do so, Shimadzu reserves the right to adapt and even discontinue delivery of its equipment. The user should ensure that any vendor whose equipment is connected to Shimadzu equipment also adapts to future version of the DICOM standard. If not, enhancement of Shimadzu may lead to loss of connectivity or interoperability.

- **Version Apply to *DAR-9500f***

Dicom Conformance Statement is applied to the following version of *DAR-9500f*. Refer to the old Dicom Conformance Statement to confirm older version of *DAR-9500f*.

・DAR-9500f : Rev.6.5 or later

2. Implementation Model

2.1. DAR-9500f

*DAR-9500f i*s an acquisition and review station used for an angiographic image in the Cardiology environment.
The application, upon user request, will:

1. Acquire images from a CathLab and encapsulate them to the DICOM Standard Format.
2. Issue **C-ECHO** command to a remote DICOM SCP.
3. Issue **C-STORE** command to configured SCP in order to archive the acquired images.
4. Issue **N-ACTION** command to configured SCP in order to request Storage Commitment.
5. Configured SCP replies with an **N-EVENT-REPORT** response confirming receipt.
6. Issue **C-MOVE** command to configured SCP.
7. Query (**C-FIND**), retrieve (**C-MOVE**) and display XA images from a remote DICOM SCP.
8. Query Modality Worklist (**C-FIND**)
9. Send **N-CREATE** and **N-SET** to MPPS server.
10. Read and display XA images from DICOM CD.
11. Act as FSC for DICOM CD. Write DICOM conformant CD-R
12. Act as FSR for DICOM CD. Read and display XA images from a DICOM conformant CD-R.
13. Print the images to remote DICOM SCP printer.

2.2. Gateway

Gateway is an option for *DAR-9500f* image transfer system. *DAR-9500f* sends the image to the Gateway, edit the image properly and send it to the set SCP.

2.3. Application Data Flow Diagram

2.3.1. DAR-9500f

(1) Verification

DAR-9500f can send **C-ECHO** verifications.

(2) Basic Worklist Management or IHE Worklist Management

DAR-9500f will issue **a C-FIND** for the hospital Worklist.

(3) Find

DAR-9500f will issue a **C-FIND** command to a remote SCP to retrieve information about the studies stored on the remote SCP.

(4) Move Images

DAR-9500f will issue a **C-MOVE** command to a remote SCP to copy study information from one SCP to another or from a remote SCP to itself.

(5) Store Images and RDSR as SCP

DAR-9500f will receive process and accept **C-STORE** command from a remote SCU and if the association succeeds, it will store the received data on its physical storage space.

(6) Store Images and RDSR as SCU

DAR-9500f or Gateway will issue a **C-STORE** command to a remote SCP. If the association is successful it will send images for storage on the remote SCP.

(7) Storage Commitment

DAR-9500f or Gateway will issue a **N-ACTION** command to a remote SCP. If the association is successful, the SCP replies with an **N-EVENT-REPORT** response confirming receipt.

(8) MPPS Management

DAR-9500f will issue an **N-CREATE** event to notify the creation of a new acquisition study and issue an **N-SET** event when this acquisition study is completed.

(9) Print

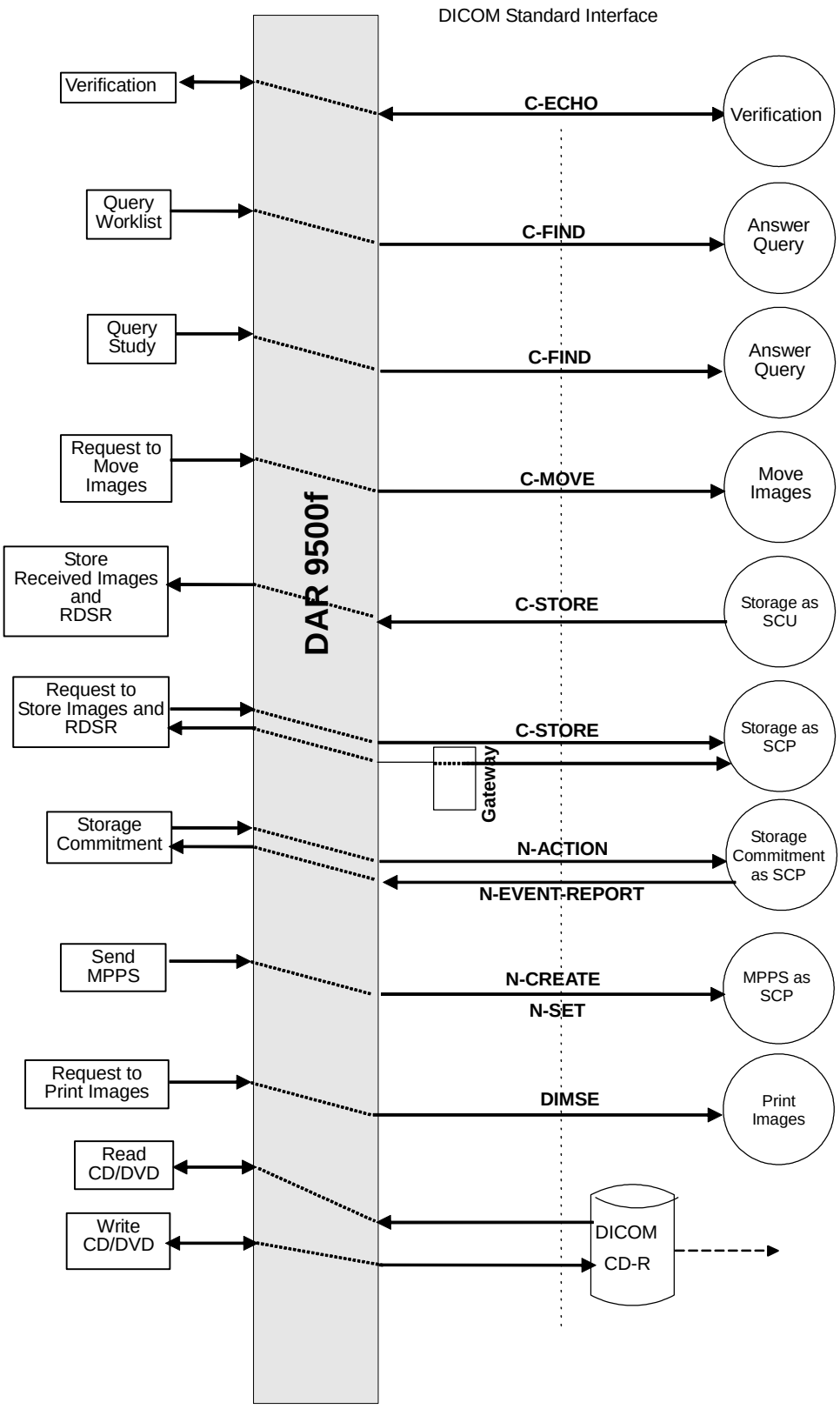
DAR-9500f will print an image or loop of images to the remote DICOM SCP printer.

(10) Read CD-R/DVD-R

DAR-9500f will read any DICOM conformant CD-R/DVD-R although it will only display compatible images.

(11) Write CD-R/DVD-R

DAR-9500f will write a DICOM conformant CD-R/DVD-R for the supported SOP classes.


DICOM Standard Interface
Verification
Query Worklist
Query Study
Request to Move Images
Store Received Images and RDSR
Request to Store Images and RDSR
Storage Commitment
Send MPPS
Request to Print Images
Read CD/DVD
Write CD/DVD
DAR 9500f
C-ECHO
C-FIND
C-FIND
C-MOVE
C-STORE
C-STORE
Gateway
N-ACTION
N-EVENT-REPORT
N-CREATE
N-SET
DIMSE
DICOM CD-R
Verification
Answer Query
Answer Query
Move Images
Storage as SCU
Storage as SCP
Storage Commitment as SCP
MPPS as SCP
Print Images

2.4. Functional Description of AE's

(1) DAR-9500f

The *DAR-9500f* AE acts as a SCU and a SCP.

- If configured, *DAR-9500f* can query for the patient Worklist. The list of scheduled patient will be presented to the user and all fields in the patient demographic entry forms will be filled with the chosen patient. If all mandatory fields cannot be filled a form will be presented to the user with the missing fields highlighted. *DAR-9500f* will issue a **C-Find** request to retrieve Worklist information from a remote Modality Worklist SCP.

- *DAR-9500f* is a system designed to acquire images coming from the FPD of a catheterization laboratory. The system then compresses these images and transmits these compressed images over the network to a remote server that will place them in a safe place for long-term archive and retrieval.

- If configured to do so, when a study is terminated, *DAR-9500f* will send a command to the remote server to move images and RDSR to one or more secondary destinations. The move may involve all the images objects of a study or only specific images belonging to one or more series. There may be any number of secondary destinations. When "Secondary Destination" is/are configured, *DAR-9500f* will issue a C-MOVE command to the server configured as "Primary Server" using either "Move by study" or "Move by Series" UID. The command will contain the "Primary Server" as origin and the "Secondary destination" as destination.

- *DAR-9500f* will issue a C-FIND command to get and display the content of a STORAGE-SCP remote server; it will then issue a C-MOVE command at study root level to the same server to transfer the selected image data proposing itself as destination.

- *DAR-9500f* will issue DIMSE-N set command to print SCP to print the image.

- *DAR-9500f* will issue a C-STORE command to a configured remote SCP to store images previously read from a DICOM CD/DVD.

- *DAR-9500f* will read data from a DIOCM CD/DVD that is present in its CD/DVD drive when requested to do so by the user

- *DAR-9500f* will accept association from remote SCU and accept and process C-STORE commands for DICOM Data Object of the allowed SOP classes.

- *DAR-9500f* will issue N-CREATE and N-SET command to MPPS server to notice the implementation of study.

2.5. Sequencing of Real World Activity

The storage Verification is done when a study is closed, and only if files for the study have been transmitted for storage to a remote SCP.
The Storage verification is done after the current study is closed.
The physical CD-R/DVD-R writing can only occur after an empty CD-R/DVD-R is inserted in the drive.

3. AE Specifications

3.1. DAR-9500f AE Specification

DAR-9500f provides Standard Conformance to the following DICOM V3.0 SOP Class as an SCU.

Table 1 Verification SOP Class as SCU

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
Study Root Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.2.2
XA – X-ray Angiographic image storage	1.2.840.10008.5.1.4.1.1.12.1
Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7
Multiframe Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
Modality Worklist SOP class	1.2.840.10008.5.1.4.31
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67

3.1.1. Association Establishment Policies

3.1.1.1. General

The following Application Context Name will be proposed and recognized by *DAR-9500f*.

- DICOM 3.0 Application Context **1.2.840.10008.3.1.1.1**

3.1.1.2. Number of Associations

The maximum number of association accepted or maintained by *DAR-9500f* is limited only by the physical memory of the machine on which it runs. Typically, it can be up to 10. However, only 1 of it will be sent from Gateway.

3.1.1.3. Asynchronous Nature

DAR-9500f allows a single outstanding operation on any association. Therefore, *DAR-9500f* does not support asynchronous operations window negotiation, other than the default as specified by the DICOM specification.

3.1.1.4. Implementation Identifying Information

DAR-9500f will respond with the following implementation identifying parameters:

Implementation Class UID (acquisition) **1.2.392.200036.9110.17.XXXXXXXXXXXXX**
Implementation Class UID (review) **1.2.392.200036.9110.18.XXXXXXXXXXXXX**

The last number of the implementation class UID is the 13 digits maximum machine serial number.

Implementation Version Name **VOYAGER_VX_X_X**
Where X_X_X is the software version

The implementation version name policies are the following: product name "**VOYAGER**" followed by the version of the product, "**_V1_0_0**".

When send the image via Gateway, it will respond with the following implementation identification parameters: 1.2.276.0.7230010.3.0.3.6.0

Implementation version name is: OFFIS_DCMTK_360.

3.1.2. Association Initiation by Real World Activity

3.1.2.1. Real World Activity – Verification

(1) Associated Real World Activity – Verification

DAR-9500f will send C-ECHO to verify the other systems if they are activated.

(2) Presentation context Table – Verification

DAR-9500f supports the transfer syntaxes listed in Table 2. For a **Verification** request, *DAR-9500f* supports the Presentation Contexts listed in Table 2.

Table 2 Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
SOP Class	SOP Class UID	Name List	UID List		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

(3) SOP Specific conformance – Verification

DAR-9500f provides the standard conformance to the DICOM Verification SOP class.

3.1.2.2. Real World Activity – Query Study

(1) Associated Real World Activity – Query Study

DAR-9500f will issue a **FIND** request when a user of *DAR-9500f* wishes to view patient and study information from a remote DICOM SCP.

(2) Presentation context Table – Query Study

DAR-9500f supports the transfer syntaxes listed in Table 3. For a **QUERY** request, *DAR-9500f* supports the Presentation Contexts listed in Table 3.

Table 3 Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
SOP Class	SOP Class UID	Name List	UID List		
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

(3) SOP Specific conformance – Query Study

DAR-9500f uses Relational query with Study root level by default. If the extended negotiation is not successful, it uses Relational query with Patient root level by default. If the extended negotiation still does not succeed, *DAR-9500f* will use Hierarchical query with patient root model.

- Matching key attribution

DAR-9500f Request matching of the following key attributes.

Table 4 Matching Key Attributes – Study Root Query/Retrieve Information Model *

Attribute Name	Type	Tag
STUDY LEVEL		
Study Date	R	(0008,0020)
Accession Number	R	(0008,0050)
Patient's Name	R	(0010,0010)
Patient ID	R	(0010,0020)
SERIES LEVEL		
Modality	R	(0008,0060)
Station Name	O	(0008,1010)
Performing Physician's Name	O	(0008,1050)

* User can input these items on the monitor as a search key.
attribute's type: Required(R), Optional(O) or Unique(U).

3.1.2.3. Real World Activity – Move Images

(1) Associated Real World Activity – Move Images

DAR-9500f will issue a MOVE request when a user of *DAR-9500f* wishes to move one or more studies from a remote DICOM SCP back to *DAR-9500f* (retrieve) or another remote DICOM SCP.

(2) Presentation context Table – Move

DAR-9500f supports the transfer syntaxes listed in Table 5. For a **MOVE** request, *DAR-9500f* supports the Presentation Contexts listed in Table 5 and Table 6.

Table 5 Move Transfer Syntaxes

Transfer Syntax	UID
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

Table 6 Move Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
SOP Class	SOP Class UID	Name List	UID List		
Study Root Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.2.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

(3) SOP Specific Conformance – Move

DAR-9500f uses specific keys for Move operation. When doing a series move the Study UID and Series UID are used as keys. When doing a study move only the Study UID is used as key.

3.1.2.4. sReal World Activity – Request to Store Images and Dose Information

(1) Associated Real World Activity – Storage as SCU

DAR-9500f will issue a **Storage** request when a user of *DAR-9500f* wishes to send a study of images to a remote DICOM SCP.

(2) Presentation context Table – Storage as SCU

DAR-9500f supports the transfer syntaxes listed in Table 7.

Table 7 Storage Presentation Context

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
SOP Class	**SOP Class UID**	**Name List**	**UID List**		
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Lossless, hierarchical, first order prediction	1.2.840.10008.1.2.4.70		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Lossless, hierarchical, first order prediction	1.2.840.10008.1.2.4.70		
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Multiframe Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
		JPEG Lossless, hierarchical, first order prediction	1.2.840.10008.1.2.4.70		

(3) Storage Presentation Contexts selection

- Transfer syntax can be configured. They can be enabled/disabled and the presented order can be selected
- If no Transfer syntax are selected in the option then the system try to negotiate the default Transfer Syntax (Original Storage Transfer Syntaxes) and Implicit VR Little Endian Transfer Syntax.

3.1.2.5. Real World Activity – Query Worklist

(1) Associated Real World Activity – Query Worklist as SCU

DAR-9500f will issue a **query Worklist** request when a user of *DAR-9500f* opens a new study if a Modality Worklist SCP is configured in its host table.

(2) Presentation context Table – Query Worklist as SCU

DAR-9500f supports the transfer syntaxes listed in Table 8. For a **Query Worklist** request, *DAR-9500f* supports the Presentation Contexts listed in Table 8.

Table 8 Worklist Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
SOP Class	SOP Class UID	Name List	UID List		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

(3) SOP Specific Conformance – general purpose Worklist SOP Class as SCU

DAR-9500f supports queries against the Worklist Information Model using the baseline **C-FIND SCU** behaviour.

Also, *DAR-9500f* supports the character sets that are indicated on section "4.4Support for Extended Character Sets".

- *DAR-9500f* Request matching of the following key attributes

Table 9 Matching Key Attributes – Query Worklist*

Attribute Name	VR	Tag
Scheduled Procedure Step Module		
Scheduled Procedure Step Sequence	SQ	(0040,0100)
>Modality**	CS	>(0008,0060)
>Scheduled Station AE Title	AE	>(0040,0001)
>Scheduled Procedure Step Start Date	DA	>(0040,0002)
>Scheduled Performing Physician's Name	PN	>(0040,0006)
Requested Procedure Module		
Requested Procedure ID	SH	(0040,1001)
Imaging Service Request Module		
Accession Number	SH	(0008,0050)
Patient Identification Module		
Patient's Name	PN	(0010,0010)
Patient ID	LO	(0010,0020)

* User can input these items on the monitor as a search key.

** Always searching with XA.

- *DAR-9500f* supports the character sets listed in Table 24.

3.1.2.6. Real World Activity – Request to Print Images

(1) Associated Real World Activity

DAR-9500f will issue a **Print** request when the user wants to send study images to the remote DICOM printer SCP.

(2) Presentation context Table – Request to Print Images

DAR-9500f supports the transfer syntaxes listed in Table 10. For a **Print** request**,** *DAR-9500f* supports the Presentation Contexts listed in Table 10.

Table 10 Request to Print Images Presentation Contexts

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
SOP Class	SOP Class UID	Name List	UID List		
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9	Explicit VR Little Endian	1.2.840.10008.1.2.1	SCU	None

(3) SOP Specific Conformance

DAR-9500f provides the standard conformance to the DICOM Basic Grayscale Print Management Meta SOP class.

3.1.2.7. Real World Activity – Create a new acquisition study

(1) Associated Real World Activity – create a new acquisition study

DAR-9500f will issue an MPPS N-CREATE event when a user of *DAR-9500f* creates a new study in acquisition, if a PPS Manager is configured in its host table.

(2) Presentation context Table – MPPS N-CREATE

DAR-9500f supports the transfer syntaxes listed in Table 11 for MPPS N-CREATE event, *DAR-9500f* supports the Presentation Contexts listed in Table 12.

Table 11 MPPS N-CREATE Transfer Syntaxes

Transfer Syntax	UID
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

Table 12 MPPS N-CREATE Presentation Contexts

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
SOP Class	SOP Class UID			
Modality Performed Procedure Step SOP class	1.2.840.10008.3.1.2.3.3	all from Table 11	SCU	None

(3) SOP Specific Conformance

DAR-9500f provides the following table describes the supported attributes of a N-CREATE message.

Table 13 Performed Procedure Step N-CREATE Attributes

Tag	VR	Attribute Name	Value of N-CREATE
SOP Common Module			
(0008,0005)	CS	Specific Character Set	See Table 24
Performed Procedure Step Relationship Module			
(0008,1120)	SQ	Referenced Patient Sequence	Zero length
>(0008,1150)	UI	Referenced SOP Class UID	N.A.
>(0008,1155)	UI	Referenced SOP Instance UID	N.A.
(0010,0010)	PN	Patient's Name	From Modality Worklist or user input
(0010,0020)	LO	Patient ID	From Modality Worklist or user input
(0010,0030)	DA	Patient's Birth Date	From Modality Worklist or user input
(0010,0040)	CS	Patient's Sex	From Modality Worklist or user input
(0040,0270)	SQ	Scheduled Step Attributes Sequence	Zero length
>(0008,0050)	SH	Accession Number	From Modality Worklist or user input
>(0008,1110)	SQ	Referenced Study Sequence	Zero length
>(0020,000D)	UI	Study Instance UID	From Modality Worklist
>(0032,1060)	LO	Requested Procedure Description	From Modality Worklist
>(0040,0007)	LO	Scheduled Procedure Step Description	From Modality Worklist
>(0040,0008)	SQ	Scheduled Protocol Code Sequence	Zero length
>(0040,0009)	SH	Scheduled Procedure Step ID	From Modality Worklist
>(0040,1001)	SH	Requested Procedure ID	From Modality Worklist
Performed Procedure Step Information Module			
(0040,0241)	AE	Performed Station AE Title	*Local* or Station AE Title (from configuration)
(0040,0242)	SH	Performed Station Name	From configuration
(0040,0243)	SH	Performed Location	Zero length
(0040,0244)	DA	Performed Procedure Step Start Time	Actual start date
(0040,0245)	TM	Performed Procedure Step Start Time	Actual start time
(0040,0250)	DA	Performed Procedure Step End Date	Zero length
(0040,0251)	TM	Performed Procedure Step End Time	Zero length
(0040,0252)	CS	Performed Procedure Step Status	IN PROGRESS
(0040,0253)	SH	Performed Procedure Step ID	Automatically created
(0040,0254)	LO	Performed Procedure Step Description	Zero length
(0040,0255)	LO	Performed Procedure Type Description	Zero length
(0008,1032)	SQ	Procedure Code Sequence	Zero length
(0040,0281)	SQ	Performed Procedure Step Discontinuation Reason Code Sequence	N.A.
>(0008,0100)	SH	Code Value	N.A.
>(0008,0102)	SH	Coding Scheme Designator	N.A.
>(0008,0104)	LO	Code Meaning	N.A.

Tag	VR	Attribute Name	Value of N-CREATE
Image Acquisition Result Module			
(0008,0060)	CS	Modality	XA
(0020,0010)	SH	Study ID	From Modality Worklist or user input
(0040,0260)	SQ	Performed Protocol Code Sequence	Zero or more items (by user input)
>(0008,0100)	SH	Code Value	An appropriate value will be sent if Sequence Item is present.
>(0008,0102)	SH	Coding Scheme Designator	An appropriate value will be sent if Sequence Item is present.
>(0008,0103)	SH	Coding Scheme Version	An appropriate value will be sent if Sequence Item is present.
>(0008,0104)	LO	Code Meaning	An appropriate value will be sent if Sequence Item is present.
(0040,0340)	SQ	Performed Series Sequence	Zero length
>(0008,1050)	PN	Performing Physician's Name	N.A.
>(0008,1070)	PN	Operator's Name	N.A.
>(0018,1030)	LO	Protocol Name	N.A.
>(0020,000E)	UI	Series Instance UID	N.A.
>(0008,103E)	LO	Series Description	N.A.
>(0008,0054)	AE	Retrieve AE Title	N.A.
>(0008,1140)	SQ	Referenced Image Sequence	N.A.
>(0040,0220)	SQ	Referenced Standalone SOP Instance Seq.	N.A.
Radiation Dose Module(if configured)			
(0008,2229)	SQ	Anatomic Structure, Space or Region Sequence	No length
>(0008,0100)	SH	Code Value	N.A.
>(0008,0102)	SH	Coding Scheme Designator	N.A.
>(0008,0104)	LO	Code Meaning	N.A.
(0018,115E)	DS	Image and Fluoroscopy Area Dose Product	Zero length
(0040,0300)	US	Total Time of Fluoroscopy	Zero length
(0040,0301)	US	Total Number of Exposures	Zero length
(0040,0302)	US	Entrance Dose	Zero length
(0040,030E)	SQ	Exposure Dose Sequence	Zero length
>(0018,0060)	DS	KVp	N.A.
>(0018,1150)	IS	Exposure Time	N.A.
>(0018,115A)	CS	Radiation Mode	N.A.
>(0018,1160)	SH	Filter Type	N.A.
>(0018,7050)	CS	Filter Material	N.A.
>(0018,8151)	DS	X-Ray Tube Current in μA	N.A.
>(0040,0310)	ST	Comments on Radiation Dose	N.A.
(0040,0310)	ST	Comments on Radiation Dose	Zero length
(0040,8302)	DS	Entrance Dose in mGy	Zero length

Enable to send the following attributes from *DAR-9500f* Ver.5.2.40 or later version.

3.1.2.8. Real World Activity – Close a study in acquisition

(1) Associated Real World Activity – close a study in acquisition

DAR-9500f will issue an MPPS N-SET event when a user of *DAR-9500f* closes a study in acquisition, if a PPS Manager is configured in its host table.

(2) Presentation context Table – MPPS N-SET

DAR-9500f supports the transfer syntaxes listed in Table 14 for MPPS N-SET event; *DAR-9500f* supports the Presentation Contexts listed in Table 15.

Table 14 MPPS N-SET Transfer Syntaxes

Transfer Syntax	UID
DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2

Table 15 MPPS N-CREATE Presentation Contexts

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
SOP Class	SOP Class UID			
Modality Performed Procedure Step SOP class	1.2.840.10008.3.1.2.3.3	all from Table 14	SCU	None

(3) SOP Specific Conformance

DAR-9500f provides The following table describes the supported attributes of a N-SET message.

Table 16 Performed Procedure Step N-SET Attributes

Tag	VR	Attribute Name	Value of N-SET
SOP Common Module			
(0008,0005)	CS	Specific Character Set	See Table24
Performed Procedure Step Relationship Module			
(0008,1120)	SQ	Referenced Patient Sequence	N.A.
(0010,0010)	PN	Patient's Name	N.A.
(0010,0020)	LO	Patient ID	N.A.
(0010,0030)	DA	Patient's Birth Date	N.A.
(0010,0040)	CS	Patient's Sex	N.A.
(0040,0270)	SQ	Scheduled Step Attributes Sequence	N.A.
>(0008,0050)	SH	Accession Number	N.A.
>(0008,1110)	SQ	Referenced Study Sequence	N.A.
>(0020,000D)	UI	Study Instance UID	N.A.
>(0032,1060)	LO	Requested Procedure Description	N.A.
>(0040,0007)	LO	Scheduled Procedure Step Description	N.A.
>(0040,0008)	SQ	Scheduled Protocol Code Sequence	N.A.
>(0040,0009)	SH	Scheduled Procedure Step ID	N.A.
>(0040,1001)	SH	Requested Procedure ID	N.A.
Performed Procedure Step Information Module			
(0040,0241)	AE	Performed Station AE Title	N.A.
(0040,0242)	SH	Performed Station Name	N.A.
(0040,0243)	SH	Performed Location	N.A.
(0040,0244)	DA	Performed Procedure Step Start Time	N.A.
(0040,0245)	TM	Performed Procedure Step Start Time	N.A.
(0040,0250)	DA	Performed Procedure Step End Date	Actual end date
(0040,0251)	TM	Performed Procedure Step End Time	Actual end time
(0040,0252)	CS	Performed Procedure Step Status	DISCONTINUED or COMPLETED
(0040,0253)	SH	Performed Procedure Step ID	N.A.
(0040,0254)	LO	Performed Procedure Step Description	N.A.
(0040,0255)	LO	Performed Procedure Type Description	N.A.
(0008,1032)	SQ	Procedure Code Sequence	N.A.
>(0008,0100)	SH	Code Value	An appropriate value will be sent if Sequence Item is present.
>(0008,0102)	SH	Coding Scheme Designator	An appropriate value will be sent if Sequence Item is present.
>(0008,0104)	LO	Code Meaning	An appropriate value will be sent if Sequence Item is present.
(0040,0281)	SQ	Performed Procedure Step Discontinuation Reason Code Sequence	Zero length only if (0040,0252) Performed Procedure Step Status is "COMPLETED". If Status is "DISCONTINUED", this sequence is sent.

Tag	VR	Attribute Name	Value of N-SET
Image Acquisition Result Module			
(0008,0060)	CS	Modality	N.A.
(0020,0010)	SH	Study ID	N.A.
(0040,0260)	SQ	Performed Protocol Code Sequence	Zero or more items
>(0008,0100)	SH	Code Value	An appropriate value will be sent if Sequence Item is present.
>(0008,0102)	SH	Coding Scheme Designator	An appropriate value will be sent if Sequence Item is present.
>(0008,0103)	SH	Coding Scheme Version	An appropriate value will be sent if Sequence Item is present.
>(0008,0104)	LO	Code Meaning	An appropriate value will be sent if Sequence Item is present.
(0040,0340)	SQ	Performed Series Sequence	One or more items
>(0008,0054)	AE	Retrieve AE Title	An appropriate value will be sent
>(0008,103E)	LO	Series Description	An appropriate value will be sent
>(0008,1050)	PN	Performing Physician's Name	An appropriate value will be sent
>(0008,1070)	PN	Operator's Name	Zero length
>(0008,1140)	SQ	Referenced Image Sequence	One or more items.
>>(0008,1150)	UI	Referenced SOP Class UID	
>>(0008,1155)	UI	Referenced SOP Instance UID	
>(0018,1030)	LO	Protocol Name	An appropriate value will be sent
>(0020,000E)	UI	Series Instance UID	An appropriate value will be sent
>(0040,0220)	SQ	Referenced Standalone SOP Instance Seq.	Zero length
Radiation Dose Module(if configured)			
(0008,2229)	SQ	Anatomic Structure, Space or Region Sequence	One or more items
>(0008,0100)	SH	Code Value	An appropriate value will be sent if Sequence Item is present.
>(0008,0102)	SH	Coding Scheme Designator	An appropriate value will be sent if Sequence Item is present.
>(0008,0104)	LO	Code Meaning	An appropriate value will be sent if Sequence Item is present.
(0018,115E)	DS	Image and Fluoroscopy Area Dose Product	Actual image area dose product
(0040,0300)	US	Total Time of Fluoroscopy	Actual total time of fluoroscopy
(0040,0301)	US	Total Number of Exposures	Actual total number of exposures
(0040,0302)	US	Entrance Dose	Actual entrance Dose in dGy
(0040,030E)	SQ	Exposure Dose Sequence	One or more items
>(0018,0060)	DS	KVp	Peak kilo voltage output of the x-ray generator
>(0018,1150)	IS	Exposure Time	The time of X-Ray exposure
>(0018,115A)	CS	Radiation Mode	Specified X-Ray radiation mode
>(0018,1160)	SH	Filter Type	Type of filter(s)
>(0018,7050)	CS	Filter Material	The X-Ray absorbing material used in the filter
>(0018,8151)	DS	X-Ray Tube Current in μA	X-Ray tube current in μA
>(0040,0310)	ST	Comments on Radiation Dose	User-defined comments on any special conditions
(0040,0310)	ST	Comments on Radiation Dose	
(0040,8302)	DS	Entrance Dose in mGy	Actual entrance Dose in mGy

Enable to send the following attributes from *DAR-9500f* Ver.5.2.40 or later version.

3.1.3. Association Acceptance Policy

3.1.3.1. Real World Activity – Store Received Images and Dose Information

(1) Associated Real World Activity – Store Received Images

DAR-9500f will archive images that are sent from **C-STORE SCU**.

(2) Presentation Context Table – Store Received Images

DAR-9500f supports the following transfer syntaxes listed in Table 17.

Table 17 Storage Transfer Syntaxes

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
SOP Class	**SOP Class UID**	**Name List**	**UID List**		
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Lossless, hierarchical, first order prediction	1.2.840.10008.1.2.4.70		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Lossless, hierarchical, first order prediction	1.2.840.10008.1.2.4.70		
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
Multiframe Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		JPEG Lossless, hierarchical, first order prediction	1.2.840.10008.1.2.4.70		

DAR-9500f returns one of the following status codes (Table 18).

Table 18 Storage status codes

Service Status	Further Meaning	Protocol Codes	Related Fields	Description
Refused	Out of resources	A700		Indicates that there was not enough storage space to store the image. Recovery from this condition is left to the administrative functions available in *DAR-9500f*.
Success	Success	0000		Operation performed properly.

(3) Presentation Context Acceptance Criterion – Store Received Images

DAR-9500f will accept any number of **Storage** Presentation Contexts per association request. Any one Abstract Syntax may be specified more than once in an association request, if the Transfer Syntaxes differ between the Presentation Contexts.

The acceptable Presentation Contexts which *DAR-9500f* may accept are specified in Table 15.

DAR-9500f will examine proposed Presentation Contexts in the order proposed. The first acceptable Presentation Context (other than Verification) determines the Abstract Syntax which will be used for the association.

3.2. DAR-9500f Storage Media Application Profile Conformance Statement

***DAR-9500f* Media Storage AE conforms to following application profiles.**

Table 19 Supported Application Profile

Supported APS	Real World Activity	Role	SC Option
DAR-9500f	Read CD-R / DVD-R	FSR	Interchange
	Write CD-R / DVD-R	FSC	Interchange

3.2.1. Real World Activity – Read CD / DVD

The *DAR-9500f* acts as a DICOM FSR with Interchange Service Class Option for images of SOP class in **Table 20**.

Table 20 Supported SOP classes as FSR

SOP Class	SOP Class UID
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67

3.2.1.1. Media Storage Application Profile

Read CD-R/DVD-R applies the following profile.

Table 21 Supported Application Profile for Read CD-R

Supported APS	Real World Activity	Role	SC Option
DAR-9500f	Read CD-R / DVD-R	FSR	Interchange

3.2.2. Real World Activity – Write CD

The *DAR-9500f* acts as a DICOM FSC with Interchange Service Class Option for images of SOP class in **Table 22**.

Table 22 Supported SOP classes as FSC

SOP Class	SOP Class UID
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
Secondary Capture Image storage	1.2.840.10008.5.1.4.1.1.7
Multi-frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67

3.2.2.1. Media Storage Application Profile

Write CD-R / DVD-R applies the following profile

Table 23 Supported Application Profile for Write CD-R/DVD-R

Supported APS	Real World Activity	Role	SC Option
DAR-9500f	Write CD-R / DVD-R	FSC	Interchange

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4. Communication Profiles

DAR-9500f / Gateway provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM standard.

4.1. TCP/IP Stack

DAR-9500f / Gateway inherits its TCP/IP stack from the computer upon which it executes.

4.1.1. Physical Media Support

DAR-9500f / Gateway is indifferent to the physical medium over which TCP/IP executes; it inherits the medium from the system upon which it executes.

4.2. Extensions/Specialization/Privatization

NA

4.3. Configuration

4.3.1. AE Title/Presentation Address Mapping

DAR-9500f maps the Application Entity titles to host name and port number via an internal configuration method. The mapping can be accessed in the configuration menu under the Database tab. Only a privileged user can change the mapping.

4.3.2. Configurable Parameters

DAR-9500f / Gateway receives its configuration parameters from the user trough the AE's GUI. Configurable parameters are:

1. Local/remote application entity title
2. Local/remote host IP address
3. Local/remote TCP/IP port
4. MAX PDU size
5. Time out for association
6. Destination of transfer (It is possible for each image, and this is only for Gateway)
7. Switching the output of live image and sub image in DSA (This is only for Gateway)

4.4. Support for Extended Character Sets

DAR-9500f is known to support the following character sets:

Table 24 Supported Character Sets

ISO-IR 100 (default)	Latin Alphabet No. 1
ISO-IR 6	Basic G0 Set
ISO-IR 87	Japanese

5. UID Generation

This section will describe how UID are generated by the *DAR-9500f /* Gateway system. Gateway has specification of UID generation in different mode, and only one of them can be used at the same time.

5.1. Types of Generated Images

The system generates the following images.

X-ray Angiographic Image[1]

DA image	: X-ray radiography image (Live image) which is used for cardiac catheterization examination.
3D-DA,3D-DSA image	: X-ray image (Live image) acquired by rotating the C-arm for 3D reconstruction.
DSA image:	: Subtraction image (Live image) which is used for such as head region study[2].
Reference image	: Reference image that represents a selected 1 frame of X-ray radiography image.
AutoStitching image	: AutoStitching image that is generated by combining acquired images.

Secondary Capture Image

Photo File	: Still image file which is captured from the X-ray radiography image.

Multi-frame Grayscale Byte Secondary Capture Image Storage

Dose Report Image	: Multiframe still image which is the exposure information of study stored as DICOM image.

* For DA and DSA, those images would be Single-plane or Bi-plane image depending on the system configuration and radiography program.

SR

RDSR:	: Used for study record information such as dose information determined in DICOM standard as Structured Report format.

[1]Depending on the system configuration and radiography program, images will be either single-plane or bi-plane image for DA and DSA image.

[2]This is a live image normally, however, subtracted image can be sent when using Gateway.

5.2. Specification

This section describes the specification of *DAR-9500f* without Gateway.

5.2.1. Definitions

Serial Number: A thirteen digit maximum, number unique to this type of system (*DAR-9500f*).
Study Date: Date in format YYYYMMDD at which the study was created.
Study Time: Time in format HHMMSS at which the study was created.
Series Number[3]: Type of the encoding/object:
1: DA image,
13: Photo File,
15: Reference image,
20: AutoStiching image,
51: DSA image
Instance Date: Date in format YYYYMMDD at which the image was created.
Instance Time: Time formatted HHMMSS.
Instance MS: The milliseconds portion of the time at which the image was created in format mmm.
Instance Number[4]: Sequential Number of the DICOM object generated by the *DAR-9500f* for all objects of the same type in the same study.
Plane Number: The image type of plane.
0: Single Plane,
1: Plane A,
2: Plane B

[3]Correspond to 0020,0011 (Series Number).

[4]Correspond to 0020,0013 (Instance Number).

5.2.2. Root and Implementation Class UID

DAR-9500f root is 1.2.392.200036.9110

- For Alexa
  Acquisition station: Implementation Class UID = <Root>.15.<Serial Number>
  Review station: Implementation Class UID = <Root>.16.<Serial Number>

  For the Anonymize function:
  This root is only used to generate the SOP Instance UID when competitor's files are being anonymized.
  Otherwise, the above roots are used for Implementation Class UID, Study Instance UID and Series Instance UID.
  DAR-9500f Root for anonymization = <Root>.66
  Acquisition station: Implementation Class UID = <Root>.66.13.<Serial Number>
  Review station: Implementation Class UID = <Root>.66.14.<Serial Number>

- For Trinias
  Acquisition station: Implementation Class UID = <Root>.17.<Serial Number>
  Review station: Implementation Class UID = <Root>.18.<Serial Number>

  For the Anonymize function:
  This root is only used to generate the SOP Instance UID when competitor's files are being anonymized.
  Otherwise, the above roots are used for Implementation Class UID, Study Instance UID and Series Instance UID.
  DAR-9500f Root for anonymization = <Root>.66
  Acquisition station: Implementation Class UID = <Root>.66.17.<Serial Number>
  Review station: Implementation Class UID = <Root>.66.18.<Serial Number>

5.2.3. Study UID[5]

Study Instance UID = <ImplementationClassUID>.<StudyDate>.<StudyTime>

5.2.4. Series UID

Series Instance UID=
<ImplementationClassUID>.<SeriesDate>.<SeriesTime>.<PlaneNumber>.<SeriesNumber>

5.2.5. SOP Instance UID

The Instance sequential number is a number that is generated by the *DAR-9500f* sequentially for each new sequence of the same type is a study.

1- **DA, DSA, 3D-DA, 3D-DSA images**
<ImplementationClassUID>.<InstanceDate>.<InstanceTime>.<PlaneNumber>.<Instance MS>

2- Photo File
<ImplementationClassUID>.<InstanceDate>.<InstanceTime>.<PlaneNumber>.<Instance MS>

3- Reference image
<ImplementationClassUID>.<InstanceDate>.<InstanceTime>.<PlaneNumber>.<Instance MS>

4- Anonymized image
<ImplementationClassUID(anonymize)>.<InstanceDate>.<InstanceTime>.<PlaneNumber>.<InstanceMS>

[5]Use the Study Instance UID from MWM, when information is taken from MWM.

5- Print SOP Instance UID
<ImplementationClassUID>.<InstanceDate>.<InstanceTime>.0.<PrintInstanceNumber>

6. Information Object Definitions

DICOM tags in each image are listed as follows.

6.1. X-ray Angiographic Image

6.1.1. Dicom Meta Information

Tag	VR	Type	Attribute Name	Remarks
(0002,0000)	UL	1	File Meta Information Group Length	
(0002,0001)	OB	1	File Meta Information Version	
(0002,0002)	UI	1	Media Storage SOP Class UID	
(0002,0003)	UI	1	Media Storage SOP Instance UID	
(0002,0010)	UI	1	Transfer Syntax UID	
(0002,0012)	UI	1	Implementation Class UID	
(0002,0013)	SH	3	Implementation Version Name	
(0002,0016)	AE	3	Source Application Entity Title	

6.1.2. Patient Module

Tag	VR	Type	Attribute Name	Remarks
(0010,0010)	PN	2	Patient's Name	
(0010,0020)	LO	2	Patient ID	
(0010,0030)	DA	2	Patient's Birth Date	
(0010,0040)	CS	2	Patient's Sex	

6.1.3. General Study Module

Tag	VR	Type	Attribute Name	Remarks
(0020,000D)	UI	1	Study Instance UID	
(0008,0020)	DA	2	Study Date	
(0008,0030)	TM	2	Study Time	
(0008,0050)	SH	2	Accession Number	
(0008,0090)	PN	2	Referring Physician's Name	
(0020,0010)	SH	2	Study ID	
(0008,1030)	LO	3	Study Description	

6.1.4. Patient Study Module

Tag	VR	Type	Attribute Name	Remarks
(0010,1010)	AS	3	Patient's Age	
(0010,1020)	DS	3	Patient's Size	
(0010,1030)	DS	3	Patient's Weight	

6.1.5. General Series Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0060)	CS	1	Modality	
(0020,000E)	UI	1	Series Instance UID	
(0020,0011)	IS	2	Series Number	
(0020,0060)	CS	2C	Laterality	
(0008,0021)	DA	3	Series Date	
(0008,0031)	TM	3	Series Time	
(0008,103E)	LO	3	Series Description	
(0008,1050)	PN	3	Performing Physician's Name	
(0008,1070)	PN	3	Operator's Name	
(0018,0015)	CS	3	Body Part Examined	
(0018,5100)	CS	2C	Patient Position	

6.1.6. General Equipment Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0070)	LO	2	Manufacturer	
(0008,0080)	LO	3	Institution Name	
(0008,0081)	ST	3	Institution Address	
(0008,1010)	SH	3	Station Name	
(0008,1040)	LO	3	Institutional Department Name	
(0018,1020)	LO	3	Software Version(s)	
(0008,1090)	LO	3	Manufacturer's Model Name	

6.1.7. Contrast/Bolus Module

Tag	VR	Type	Attribute Name	Remarks
(0018,0010)	LO	2	Contrast/Bolus Agent	
(0018,1042)	TM	3	Contrast/Bolus Start Time	

6.1.8. Cine Module

Tag	VR	Type	Attribute Name	Remarks
(0018,1065)	DS	1C	Frame Time Vector	Not available on Reference image.
(0008,2144)	IS	3	Recommended Display Frame Rate	Not available on Reference image.
(0018,0040)	IS	3	Cine Rate	Only Fluoro image

6.1.9. Multi-Frame Module

Tag	VR	Type	Attribute Name	Remarks
(0028,0008)	IS	1	Number of Frames	Not available on Reference image.
(0028,0009)	AT	1	Frame Increment Pointer	Not available on Reference image.

6.1.10. Frame Pointers Module

Tag	VR	Type	Attribute Name	Remarks
(0028,6010)	US	3	Representative Frame Number	Not available on Reference image.

6.1.11. Mask Module

(This module is available only if the image is DSA.)

Tag	VR	Type	Attribute Name	Remarks
(0028,6100)	SQ	1	Mask Subtraction Sequence	Present in original DICOM file, not in processed DICOM file
>(0028,6101)	CS	1	Mask Operation	Present in original DICOM file, not in processed DICOM file
>(0028,6110)	US	1C	Mask Frame Numbers	Present in original DICOM file, not in processed DICOM file
>(0028,6112)	US	3	Contrast Frame Averaging	Present in original DICOM file, not in processed DICOM file
>(0028,6114)	FL	3	Mask Sub-pixel Shift	Present in original DICOM file, not in processed DICOM file
>(0028,6190)	ST	3	Mask Operation Explanation	Present in original DICOM file, not in processed DICOM file
(0028,1090)	CS	2	Recommended Viewing Mode	Present in original DICOM file, not in processed DICOM file

6.1.12. Display Shutter Module

Tag	VR	Type	Attribute Name	Remarks
(0018,1600)	CS	1	Shutter Shape	
(0018,1602)	IS	1C	Shutter Left Vertical Edge	
(0018,1604)	IS	1C	Shutter Right Vertical Edge	
(0018,1606)	IS	1C	Shutter Upper Horizontal Edge	
(0018,1608)	IS	1C	Shutter Lower Horizontal Edge	
(0018,1622)	US	3	Shutter Presentation Value	

6.1.13. General Image Module

Tag	VR	Type	Attribute Name	Remarks
(0020,0013)	IS	2	Instance Number	
(0008,0023)	DA	2C	Content Date	
(0008,0033)	TM	2C	Content Time	
(0020,0020)	CS	2C	Patient Orientation	
(0008,0022)	DA	3	Acquisition Date	
(0008,0032)	TM	3	Acquisition Time	
(0008,2111)	ST	3	Derivation Description	This tag is present in processed DICOM file but not in original DICOM file. Value is "SUBTRACTED", “ENHANCED”, “ANNOTATED”, “STITCHING” or “STITCHING ENHANCED”
(0008,2112)	SQ	3	Source Image Sequence	This tag is present in processed DICOM file but not in original DICOM file.
(0020,4000)	LT	3	Image Comments	

6.1.14. Image Pixel Module

Tag	VR	Type	Attribute Name	Remarks
(0028,0010)	US	1	Rows	
(0028,0011)	US	1	Columns	
(7FE0,0010)	OW	1	Pixel Data	

6.1.15. X-ray Image Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0008)	CS	1	Image Type	
(0028,0002)	US	1	Samples per Pixel	
(0028,0004)	CS	1	Photometric Interpretation	
(0028,0100)	US	1	Bits Allocated	
(0028,0101)	US	1	Bits Stored	
(0028,0102)	US	1	High Bit	
(0028,0103)	US	1	Pixel Representation	
(0028,1040)	CS	1	Pixel Intensity Relationship	
(0008,1140)	SQ	1C	Referenced Image Sequence	Available on Bi-plane image.
>(0008,1150)	UI	3	Referenced SOP Class UID	Available on Bi-plane image.
>(0008,1155)	UI	3	Referenced SOP Instance UID	Available on Bi-plane image.

6.1.16. Curve Module

Tag	VR	Type	Attribute Name	Remarks
(500x,0005)	US	1	Curve Dimensions	Available when ECG is connected.
(500x,0010)	US	1	Number of Points	Available when ECG is connected.
(500x,0020)	CS	1	Type of Data	Available when ECG is connected.
(500x,0103)	US	1	Data Value Representation	Available when ECG is connected.
(500x,3000)	OW	1	Curve Data	Available when ECG is connected.
(500x,0110)	US	1C	Curve Data Descriptor	Available when ECG is connected.
(500x,0112)	US	1C	Coordinate Start Value	Available when ECG is connected.
(500x,0114)	US	1C	Coordinate Step Value	Available when ECG is connected.
(500x,0022)	LO	3	Curve Description	Available when ECG is connected.
(500x,0030)	SH	3	Axis Units	Available when ECG is connected.
(500x,2500)	LO	3	Curve Label	Available when ECG is connected.

6.1.17. X-Ray Acquisition Module

Tag	VR	Type	Attribute Name	Remarks
(0018,1155)	CS	1	Radiation Setting	
(0018,0060)	DS	2	KVP	
(0018,1147)	CS	3	Field of View Shape	
(0018,1149)	IS	3	Field of View Dimension(s)	
(0018,1150)	IS	2C	Exposure Time	
(0018,1151)	IS	2C	X-Ray Tube Current	
(0018,1152)	IS	2C	Exposure	
(0018,1154)	DS	3	Average Pulse Width	
(0018,1155)	CS	1	Radiation Setting	
(0018,115A)	CS	3	Radiation Mode	
(0018,115E)	DS	3	Image Area Dose Product	Available when dosimeter is connected.
(0018,1166)	CS	3	Grid	
(0018,1190)	DS	3	Focal Spot(s)	
(0018,8150)	DS	3	Exposure Time (us)	
(0028,0030)	DS	1C	Pixel Spacing	
(0028,0A02)	CS	3	Pixel Spacing Calibration Type	
(0028,0A04)	LO	1C	Pixel Spacing Calibration Description	
(0040,8302)	DS	3	Entrance Dose in mGy	

6.1.18. X-ray Collimator Module

Tag	VR	Type	Attribute Name	Remarks
(0018,1700)	CS	1	Collimator Shape	
(0018,1702)	IS	1C	Collimator Left Vertical Edge	
(0018,1704)	IS	1C	Collimator Right Vertical Edge	
(0018,1706)	IS	1C	Collimator Upper Horizontal Edge	
(0018,1708)	IS	1C	Collimator Lower Horizontal Edge	
(0018,1720)	IS	1C	Vertices of the Polygonal Collimator	

6.1.19. X-ray Table Module

Tag	VR	Type	Attribute Name	Remarks
(0018,1134)	CS	2	Table Motion	
(0018,1135)	DS	2C	Table Vertical Increment	
(0018,1136)	DS	2C	Table Lateral Increment	
(0018,1137)	DS	2C	Table Longitudinal Increment	
(0018,1138)	DS	3	Table Angle	

6.1.20.

6.1.20. XA Positioner Module

Tag	VR	Type	Attribute Name	Remarks
(0018,1510)	DS	2	Positioner Primary Angle	
(0018,1511)	DS	2	Positioner Secondary Angle	
(0018,1500)	CS	2C	Positioner Motion	
(0018,1520)	DS	2C	Positioner Primary Angle Increment	Available on 3D and rotational image.
(0018,1521)	DS	2C	Positioner Secondary Angle Increment	Available on 3D and rotational image.
(0018,1110)	DS	3	Distance Source to Detector	
(0018,1111)	DS	3	Distance Source to Patient	
(0018,1114)	DS	3	Estimated Radiographic Magnification Factor	
(0018,1530)	DS	3	Detector Primary Angle	
(0018,1531)	DS	3	Detector Secondary Angle	

6.1.21. DX Detector Module

Tag	VR	Type	Attribute Name	Remarks
(0018,1164)	DS	1	Imager Pixel Spacing	
(0018,7004)	CS	2	Detector Type	

6.1.22. SOP Common Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0005)	CS	1C	Specific Character Set	
(0008,0016)	UI	1C	SOP Class UID	
(0008,0018)	UI	1C	SOP Instance UID	
(0008,0012)	DA	3	Instance Creation Date	
(0008,0013)	TM	3	Instance Creation Time	

6.1.23. VOI LUT Module

Tag	VR	Type	Attribute Name	Remarks
(0028,1051)	DS	1C	Window Width	
(0028,1050)	DS	3	Window Center	

6.1.24. Additional Attributes Module

Tag	VR	Type	Attribute Name	Remarks
(0008,1160)	IS	3	Referenced Frame Number	Available on Reference image.
(0018,1160)	SH	3	Filter Type	
(0018,7050)	CS	3	Filter Material	
(0018,7052)	DS	3	Filter Thickness Minimum	
(0018,7054)	DS	3	Filter Thickness Maximum	

6.2. Secondary Capture Image

6.2.1. Dicom Meta Information

Tag	VR	Type	Attribute Name	Remarks
(0002,0000)	UL	1	File Meta Information Group Length	
(0002,0001)	OB	1	File Meta Information Version	
(0002,0002)	UI	1	Media Storage SOP Class UID	
(0002,0003)	UI	1	Media Storage SOP Instance UID	
(0002,0010)	UI	1	Transfer Syntax UID	
(0002,0012)	UI	1	Implementation Class UID	
(0002,0013)	SH	3	Implementation Version Name	
(0002,0016)	AE	3	Source Application Entity Title	

6.2.2. Patient Module

Tag	VR	Type	Attribute Name	Remarks
(0010,0010)	PN	2	Patient's Name	
(0010,0020)	LO	2	Patient ID	
(0010,0030)	DA	2	Patient's Birth Date	
(0010,0040)	CS	2	Patient's Sex	

6.2.3. General Study Module

Tag	VR	Type	Attribute Name	Remarks
(0020,000D)	UI	1	Study Instance UID	
(0008,0020)	DA	2	Study Date	
(0008,0030)	TM	2	Study Time	
(0008,0050)	SH	2	Accession Number	
(0008,0090)	PN	2	Referring Physician's Name	
(0020,0010)	SH	2	Study ID	
(0008,1030)	LO	3	Study Description	

6.2.4. Patient Study Module

Tag	VR	Type	Attribute Name	Remarks
(0010,1010)	AS	3	Patient's Age	
(0010,1020)	DS	3	Patient's Size	
(0010,1030)	DS	3	Patient's Weight	

6.2.5. General Series Module

Tag	VR	Type	Attribute Name	Remarks
(0020,000E)	UI	1	Series Instance UID	
(0020,0011)	IS	2	Series Number	
(0020,0060)	CS	2C	Laterality	
(0008,0021)	DA	3	Series Date	
(0008,0031)	TM	3	Series Time	
(0008,103E)	LO	3	Series Description	
(0008,1050)	PN	3	Performing Physician's Name	
(0008,1070)	PN	3	Operators' Name	
(0018,0015)	CS	3	Body Part Examined	
(0018,5100)	CS	2C	Patient Position	

6.2.6. General Equipment Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0070)	LO	2	Manufacturer	
(0008,0080)	LO	3	Institution Name	
(0008,0081)	ST	3	Institution Address	
(0008,1010)	SH	3	Station Name	
(0008,1040)	LO	3	Institutional Department Name	
(0008,1090)	LO	3	Manufacturer's Model Name	
(0018,1020)	LO	3	Software Version(s)	

6.2.7. SC Equipment Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0064)	CS	1	Conversion Type	
(0008,0060)	CS	3	Modality	

6.2.8. General Image Module

Tag	VR	Type	Attribute Name	Remarks
(0020,0013)	IS	2	Instance Number	
(0008,0023)	DA	2C	Content Date	
(0008,0033)	TM	2C	Content Time	
(0020,0020)	CS	2C	Patient Orientation	
(0008,0008)	CS	3	Image Type	
(0008,0022)	DA	3	Acquisition Date	
(0008,0032)	TM	3	Acquisition Time	
(0008,2111)	ST	3	Derivation Description	
(0020,4000)	LT	3	Image Comments	
(0008,2112)	SQ	3	Source Image Sequence	
>(0008,1150)	UI	3	Referenced SOP Class UID	
>(0008,1155)	UI	3	Referenced SOP Instance UID	

6.2.9. Image Pixel Module

Tag	VR	Type	Attribute Name	Remarks
(0028,0002)	US	1	Samples per Pixel	
(0028,0004)	CS	1	Photometric Interpretation	
(0028,0010)	US	1	Rows	
(0028,0011)	US	1	Columns	
(0028,0100)	US	1	Bits Allocated	
(0028,0101)	US	1	Bits Stored	
(0028,0102)	US	1	High Bit	
(0028,0103)	US	1	Pixel Representation	
(7FE0,0010)	OW	1	Pixel Data	

6.2.10. SC Image Module

Tag	VR	Type	Attribute Name	Remarks
(0028,0030)	DS	1C	Pixel Spacing	
(0028,0A02)	CS	3	Pixel Spacing Calibration Type	
(0028,0A04)	LO	1C	Pixel Spacing Calibration Description	

6.2.11. SOP Common Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0005)	CS	1C	Specific Character Set	
(0008,0016)	UI	1C	SOP Class UID	
(0008,0018)	UI	1C	SOP Instance UID	
(0008,0012)	DA	3	Instance Creation Date	
(0008,0013)	TM	3	Instance Creation Time	

6.2.12. VOI LUT Module

Tag	VR	Type	Attribute Name	Remarks
(0028,1051)	DS	1C	Window Width	
(0028,1050)	DS	3	Window Center	

6.2.13. Additional Attributes Module

Tag	VR	Type	Attribute Name	Remarks
(0008,1160)	IS	3	Referenced Frame Number	
(0018,1154)	DS	3	Average Pulse Width	For Fluoro only
(0018,1160)	SH	3	Filter Type	
(0018,7050)	CS	3	Filter Material	
(0018,7052)	DS	3	Filter Thickness Minimum	
(0018,7054)	DS	3	Filter Thickness Maximum	
(0028,1040)	CS	3	Pixel Intensity Relationship	
(0040,8302)	DS	3	Entrance Dose in mGy	

6.3. Multi-frame Grayscale Byte Secondary Capture Image Storage

6.3.1. Dicom Meta Information

Tag	VR	Type	Attribute Name	Remarks
(0002,0000)	UL	1	File Meta Information Group Length	
(0002,0001)	OB	1	File Meta Information Version	
(0002,0002)	UI	1	Media Storage SOP Class UID	
(0002,0003)	UI	1	Media Storage SOP Instance UID	
(0002,0010)	UI	1	Transfer Syntax UID	
(0002,0012)	UI	1	Implementation Class UID	
(0002,0013)	SH	3	Implementation Version Name	
(0002,0016)	AE	3	Source Application Entity Title	

6.3.2. Patient Module

Tag	VR	Type	Attribute Name	Remarks
(0010,0010)	PN	2	Patient's Name	
(0010,0020)	LO	2	Patient ID	
(0010,0030)	DA	2	Patient's Birth Date	
(0010,0040)	CS	2	Patient's Sex	

6.3.3. General Study Module

Tag	VR	Type	Attribute Name	Remarks
(0020,000D)	UI	1	Study Instance UID	
(0008,0020)	DA	2	Study Date	
(0008,0030)	TM	2	Study Time	
(0008,0050)	SH	2	Accession Number	
(0008,0090)	PN	2	Referring Physician's Name	
(0020,0010)	SH	2	Study ID	
(0008,1030)	LO	3	Study Description	

6.3.4. Patient Study Module

Tag	VR	Type	Attribute Name	Remarks
(0010,1010)	AS	3	Patient's Age	
(0010,1020)	DS	3	Patient's Size	
(0010,1030)	DS	3	Patient's Weight	

6.3.5. General Series Module

Tag	VR	Type	Attribute Name	Remarks
(0020,000E)	UI	1	Series Instance UID	
(0020,0011)	IS	2	Series Number	
(0008,0021)	DA	3	Series Date	
(0008,0031)	TM	3	Series Time	
(0008,103E)	LO	3	Series Description	
(0008,1050)	PN	3	Performing Physician's Name	
(0008,1070)	PN	3	Operators' Name	

6.3.6. General Equipment Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0070)	LO	2	Manufacturer	
(0008,0080)	LO	3	Institution Name	
(0008,0081)	ST	3	Institution Address	
(0008,1010)	SH	3	Station Name	
(0008,1040)	LO	3	Institutional Department Name	
(0008,1090)	LO	3	Manufacturer's Model Name	
(0018,1020)	LO	3	Software Version(s)	

6.3.7. SC Equipment Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0064)	CS	1	Conversion Type	
(0008,0060)	CS	3	Modality	

6.3.8. General Image Module

Tag	VR	Type	Attribute Name	Remarks
(0020,0013)	IS	2	Instance Number	
(0008,0023)	DA	2C	Content Date	
(0008,0033)	TM	2C	Content Time	
(0020,0020)	CS	2C	Patient Orientation	
(0008,0008)	CS	3	Image Type	
(0008,0022)	DA	3	Acquisition Date	
(0008,0032)	TM	3	Acquisition Time	
(0008,2111)	ST	3	Derivation Description	

6.3.9. Image Pixel Module

Tag	VR	Type	Attribute Name	Remarks
(0028,0002)	US	1	Samples per Pixel	
(0028,0004)	CS	1	Photometric Interpretation	
(0028,0010)	US	1	Rows	
(0028,0011)	US	1	Columns	
(0028,0100)	US	1	Bits Allocated	
(0028,0101)	US	1	Bits Stored	
(0028,0102)	US	1	High Bit	
(0028,0103)	US	1	Pixel Representation	
(7FE0,0010)	OW	1	Pixel Data	

6.3.10. Multi-frame Module

Tag	VR	Type	Attribute Name	Remarks
(0028,0008)	IS	1	Number of Frames	

6.3.11. SC Multi-frame Image Module

Tag	VR	Type	Attribute Name	Remarks
(A02)	AT	1C	Frame Increment Pointer.	
(0028,0301)	CS	1	Burned In Annotation	
(0028,1052)	DS	1C	Rescale Intercept	
(0028,1053)	DS	1C	Rescale Slope	
(0028,1054)	LO	1C	Rescale Type	
(2050,0020)	CS	1C	Presentation LUT Shape.	

6.3.12. SC Multi-frame Vector Module

Tag	VR	Type	Attribute Name	Remarks
(0018,2001)	IS	1C	Page Number Vector	

6.3.13. SOP Common Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0005)	CS	1C	Specific Character Set	
(0008,0016)	UI	1C	SOP Class UID	
(0008,0018)	UI	1C	SOP Instance UID	
(0008,0012)	DA	3	Instance Creation Date	
(0008,0013)	TM	3	Instance Creation Time	

6.3.14. VOI LUT Module

Tag	VR	Type	Attribute Name	Remarks
(0028,1051)	DS	1C	Window Width	
(0028,1050)	DS	3	Window Center	

6.4. X-Ray Radiation Dose SR

6.4.1. Dicom Meta Information

Tag	VR	Type	Attribute Name	Remarks
(0002,0000)	UL	1	File Meta Information Group Length	
(0002,0001)	OB	1	File Meta Information Version	
(0002,0002)	UI	1	Media Storage SOP Class UID	
(0002,0003)	UI	1	Media Storage SOP Instance UID	
(0002,0010)	UI	1	Transfer Syntax UID	
(0002,0012)	UI	1	Implementation Class UID	
(0002,0013)	SH	3	Implementation Version Name	
(0002,0016)	AE	3	Source Application Entity Title	

6.4.2. Patient Module

Tag	VR	Type	Attribute Name	Remarks
(0010,0010)	PN	2	Patient's Name	
(0010,0020)	LO	2	Patient ID	
(0010,0030)	DA	2	Patient's Birth Date	
(0010,0040)	CS	2	Patient's Sex	

6.4.3. General Study Module

Tag	VR	Type	Attribute Name	Remarks
(0020,000D)	UI	1	Study Instance UID	
(0008,0020)	DA	2	Study Date	
(0008,0030)	TM	2	Study Time	
(0008,0050)	SH	2	Accession Number	
(0008,0090)	PN	2	Referring Physician's Name	
(0020,0010)	SH	2	Study ID	
(0008,1030)	LO	3	Study Description	

6.4.4. Patient Study Module

Tag	VR	Type	Attribute Name	Remarks
(0010,1010)	AS	3	Patient's Age	
(0010,1020)	DS	3	Patient's Size	
(0010,1030)	DS	3	Patient's Weight	

6.4.5. SR Document Series Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0060)	CS	1	Modality	
(0020,000E)	UI	1	Series Instance UID	
(0020,0011)	IS	2	Series Number	
(0008,0021)	DA	3	Series Date	
(0008,0031)	TM	3	Series Time	
(0008,103E)	LO	3	Series Description	
(0008,1111)	SQ	2	Referenced Performed Procedure Step Sequence	
>(0008,1150)	UI	1	Referenced SOP Class UID	
>(0008,1155)	UI	1	Referenced SOP Instance UID	

6.4.6. General Equipment Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0080)	LO	3	Institution Name	
(0008,0081)	ST	3	Institution Address	
(0008,1010)	SH	3	Station Name	
(0008,1040)	LO	3	Institutional Department Name	

6.4.7. Enhanced General Equipment Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0070)	LO	2	Manufacturer	
(0008,1090)	LO	3	Manufacturer's Model Name	
(0018,1000)	LO	3	Device Serial Number	
(0018,1020)	LO	3	Software Version(s)	

6.4.8. SR Document General Module

Tag	VR	Type	Attribute Name	Remarks
(0020,0013)	IS	2	Instance Number	
(0040,A491)	CS	1	Completion Flag	
(0040,A493)	CS	1	Verification Flag	
(0008,0023)	DA	2C	Content Date	
(0008,0033)	TM	2C	Content Time	
(0040,A372)	SQ	2	Performed Procedure Code Sequence	Used when producing RDSR.

6.4.9. SOP Common Module

Tag	VR	Type	Attribute Name	Remarks
(0008,0005)	CS	1C	Specific Character Set	
(0008,0016)	UI	1	SOP Class UID	
(0008,0018)	UI	1	SOP Instance UID	

6.4.10. Additional Attributes Module

Tag	VR	Type	Attribute Name	Remarks
(0008,1050)	PN	3	Performing Physician's Name	
(0008,1070)	PN	3	Operators' Name	
(0018,5100)	CS	3	Patient Position	

6.4.11. SR Document Content Module

Tag	VR	Type	Attribute Name	Remarks
(0040,A504)	SQ	1C	Content Template Sequence	
>(0008,0105)	CS	1	Mapping Resource	
>(0040,DB00)	CS	1	Template Identifier	
(0040,A050)	CS	1	Continuity of Content	
(0040,A730)	SQ	1C	Content Sequence	
>(0040,A010)	CS	1	Relationship Type	
>(0040,A040)	CS	1	Value Type	
>(0040,A043)	SQ	1C	Concept Name Code Sequence	

6.4.12. SR Document Content Descriptions

The product supports the following root Templates.

SOP Class	Template ID	Template Name	Remarks
(0040,A504)	10001	X-Ray Radiation Dose	

6.4.13. TID 10001 Projection X-Ray Radiation Dose

VT	Concept Name	VM	Value Set Constraint	Remarks
CONTAINER	EV(113701, DCM, "X-Ray Radiation Dose Report")	1		
CODE	EV(121058, DCM, "Procedure reported")	1	DT(113704, DCM, "Projection X-Ray")	
CODE	EV(G-C0E8, SRT, "Has Intent")	1	DCID(3629) procedure Intent	
INCLUDE	DTID(1002) Observer Context	1-n		Refer to DTID(1002).
CODE	EV(113705, DCM, "Scope of Accumulation")	1	DCID(10000) Scope of Accumulation	
UIDREF	DCID(10001) UID Types	1		
INCLUDE	DTID(10002) Accumulated X-Ray Dose	1	EV(113622, DCM, "Single Plane")	Refer to DTID(10002). For Single-plane
INCLUDE	DTID(10002) Accumulated X-Ray Dose	1	EV(113620, DCM, "Plane A")	Refer to DTID(10002). For Bi-plane Frontal
INCLUDE	DTID(10002) Accumulated X-Ray Dose	1	EV(113621, DCM, "Plane B")	Refer to DTID(10002). For Bi-plane Lateral
INCLUDE	DTID(10003) Irradiation Event X-Ray Data	1-n		
CODE	EV(113854, DCM, "Source of Dose Information")	1-n	DCID(10020) Source of Projection X-Ray Dose Information	

6.4.14. TID1002 Observer Context

VT	Concept Name	VM	Value Set Constraint	Remarks
CODE	EV(121005, DCM, "Observer Type")	1	DCID(270) Observer Type	
INCLUDE	DTID(1003) Person observer identifying attributes	1		Refer to DTID (1003)
INCLUDE	DTID(1004) Device observer identifying attributes	1		Refer to DTID (1004)

6.4.15. TID 1003 Person Observer Identifying Attributes

VT	Concept Name	VM	Value Set Constraint	Remarks
PNAME	EV (121008,DCM, "Person Observer Name ")	1		
TEXT	EV (121009,DCM, "Person Observer's Organization Name")	1	Defaults to Institution Name (0008,0080) of the General Equipment Module	
CODE	EV (121010,DCM, "Person Observer's Role in the Organization")	1	BCID 7452 "Organizational Roles"	
CODE	EV (121011,DCM, "Person Observer's Role in this Procedure")	1	BCID 7453 "Performing Roles"	
TEXT	EV (128775,DCM, "Identifier within Person Observer's Role")	1		

6.4.16. TID 1004 Device Observer Identifying Attributes

VT	Concept Name	VM	Value Set Constraint	Remarks
UIDREF	EV(121012, DCM, "Device Observer UID")	1		Implementation Class UID
TEXT	EV(121013, DCM, "Device Observer Name")	1	Defaults to value of Station Name(0008,1010) in General Equipment Module	
TEXT	EV(121014, DCM, "Device Observer Manufacturer")	1	Defaults to value of Manufacturer (0008,0070) in General Equipment Module	
TEXT	EV(121015, DCM, "Device Observer Model Name")	1	Defaults to value of Manufacturer's Model Name(0008,1090) in GeneralEquipment Module	If value of Manufacturer Model Name (0008,1090) is empty, the value is "DAR-9500f"
TEXT	EV (121016,DCM, "Device Observer Serial Number")	1	Defaults to value of DeviceSerial Number (0018,1000) in General Equipment Module	

6.4.17. TID 10002 Accumulated X-Ray Dose

VT	Concept Name	VM	Value Set Constraint	Remarks
CONTAINER	EV(113702, DCM, “Accumulated X-Ray Dose Data”)	1		
INCLUDE	EV(113764, DCM, “Acquisition Plane”)	1		Either one of the following: 113622, DCM, Single Plane 113620, DCM, “PlaneA” 113621, DCM, “PlaneB”
CONTAINER	EV(122505, DCM, “Calibration”)	1-n		
CODE	EV(113794,DCM, “Dose measurement”)	1	DCID(10010) Dose measurement Devices	
DATETIME	EV(113723, DCM, “Calibration Date”)	1		
NUM	EV(122322, DCM, “Calibration Factor”)	1	Units = EV(1, UCUM, “no units”)	
NUM	EV(113763, DCM, “Calibration Uncertainty”)	1	Units = EV(%, UCUM, “Percent”)	
TEXT	EV(113724, DCM, “Calibration Responsible Party”)	1		
TEXT	EV(113720, DCM, “Calibration Protocol”)	1		
INCLUDE	DTID(10004) Accumulated Projection X-Ray Dose	1		Refer to DTID(10004).
INCLUDE	DTID(10007) Accumulated Projection X-Ray Dose	1		Refer to DTID(10007).

6.4.18. TID 10003 Irradiation Event X-Ray Data

VT	Concept Name	VM	Value Set Constraint	Remarks
CONTAINER	EV(113706, DCM, "Irradiation Event X-Ray Data")	1		
CODE	EV(113764, DCM, "Acquisition Plane ")	1	DCID(10003) Equipment Plane Identification	Either one of the following: 113620, DCM, Plane A 113621, DCM, Plane B 113622, DCM, Single Plane
DATATIME	DT(111526, DCM, "DataTime Started")	1		
CODE	EV(113721, DCM, "Irradiation Event Type")	1	DCID(10002) Irradiation Event Type	
TEXT	EV(125203, DCM, "Acquisition Protocol")	1		Set DUP name during acquisition.
UIDREF	EV(113769, DCM, "Irradiation Event UID")	1		
NUM	EV(122130, DCM, "Dose Area Product")	1	Units = EV(Gy.m2, UCUM, "Gy.m2")	
CODE	EV(113745, DCM, "Patient table Relationship")	1		Present if Patient Orientation has been set.
CODE	EV(113743, DCM, "Patient Orientation")	1		Present if Patient Orientation has been set.
CODE	EV(113744, DCM, "Patient Orientation Modifier")	1		Present if Patient Orientation has been set.
CODE	EV(123014, DCM, "Target Region")	1	DCID(4031) Common Anatomic Region	
INCLUDE	DTID(10003A) Irradiation Event X-Ray Detector Data	1		Refer to DTID(10003A).
INCLUDE	DTID(10003B) Irradiation Event X-Ray Source Data	1		Refer to DTID(10003B).
INCLUDE	DTID(10003C) Irradiation Event X-Ray Mechanical Data	1		Refer to DTID(10003C).

6.4.19. TID 10003A Irradiation Event X-Ray Data

IMAGE	EV(113795, DCM, "Acquired Image")	1-n		

6.4.20. TID 10003B Irradiation Event X-Ray Source Data

VT	Concept Name	VM	Value Set Constraint	Remarks
NUM	EV(112011, DCM, Positioner Primary Angle)	1	Units = EV(deg, UCUM, “deg”)	
NUM	EV(113738, DCM, “Dose(RP)”)	1	Units = EV(Gy, UCUM, “Gy”)	
TEXT	EV(113780, DCM, "Reference Point Definition")	1		15cm from Isocenter toward Source
CODE	EV(113732, DCM, “Fluoro Mode”)	1	DCID(10004) Fluoro Modes	
NUM	EV(113791, DCM, “Pulse Rate”)	1	Units = EV({pulse}/s, UCUM, “pulse/s”)	
NUM	EV(113768, DCM, “Number of Pulses”)	1	Units = EV(1, UCUM, “no units”)	
NUM	EV(113793, DCM, “Pulse Width”)	1-n	Units = EV(ms, UCUM, “ms”)	
NUM	EV(113742, DCM, “Irradiation Duration”)	1	Units = EV(s, UCUM, “s”)	
NUM	EV(113733, DCM “KVP”)	1-n	EV(kV, UCUM, “kV”)	
NUM	EV(113734, DCM, ”X-Ray Tube Current”)	1-n	Units = EV(ms, UCUM, “ms”)	
NUM	EV(113767, DCM, "Average X-Ray Tube Current")	1	Units = EV(mA, UCUM, "mA")	
NUM	EV(113824, DCM, “Exposure Time”)	1-n	Units = EV(ms, UCUM, “ms”)	
NUM	EV(113736, DCM, Exposure)	1-n	Units = EV(uAs, UCUM, ”uAs”)	
NUM	EV(113766, DCM, “Focal Spot Size”)	1	Units = EV(mm, UCUM, “mm”)	
CONTAINER	EV(113771, DCM, “X-Ray Filter”)	1-n		
CODE	EV(113772, DCM, “X-Ray Filter Type”)	1	DCID(10007) X-Ray Filter Types	
CODE	EV(113757, DCM, “X-Ray Filter material”)	1	DCID(10006) X-Ray Filter Material	
NUM	EV(113758, DCM, “X-Ray Filter Thickness Minimum”)	1	Units = EV(mm, UCUM, “mm”)	
NUM	EV(113773, DCM, “X-Ray Filter Thickness Maximum”)	1	Units = EV(mm, UCUM, “mm”)	
NUM	EV(113790, DCM, “Collimated Field Area”)	1	Units = EV(m2, UCUM, “m^2”)	
NUM	EV (113788, DCM, "Collimated Field Height")	1	UNITS = EV (mm, UCUM, "mm")	
NUM	EV (113789, DCM, "Collimated Field Width")	1	UNITS = EV (mm, UCUM, "mm")	

6.4.21. TID 10003C Accumulated Projection X-Ray Dose

VT	Concept Name	VM	Value Set Constraint	Remarks
NUM	EV(112011, DCM, Positioner Primary Angle)	1	Units = EV(deg, UCUM, “deg”)	
NUM	EV(112012, DCM, “Positioner Secondary Angle”)	1	Units = EV(deg, UCUM, deg)	
NUM	EV(113739, DCM, “Positioner Primary End Angle”)	1	Units = EV(deg, UCUM, “deg”)	Present for rotational
NUM	EV(113740, DCM, “Positioner Secondary End Angle”)	1	Units = EV(deg, UCUM, “deg”)	Present for rotational
NUM	EV(113754, DCM, "Table Head Tilt Angle")	1	Units = EV(deg, UCUM, "°")	
NUM	EV(113755, DCM, "Table Horizontal Rotation Angle")	1	Units = EV(deg, UCUM, "°")	
NUM	EV(113756, DCM, "Table Cradle Tilt Angle")	1	Units = EV(deg, UCUM, "°")	
NUM	DCID(10008) Dose Related Distance Measurements	1-n	Units = EV(mm, UCUM, “mm”)	See Table 25

Table 25 Dose Related Distance Measurements

Code Scheme Designator	Code Value	Code Meaning	Remarks
DCM	113748	Distance Source to Isocenter	Request on IEC 61910-1 Ed. 1.0
DCM	113737	Distance Source to Reference Point	
DCM	113750	Distance Source to Detector	
DCM	113751	Table Longitudinal Position	
DCM	113752	Table Lateral Position	
DCM	113753	Table Height Position	
DCM	113759	Table Longitudinal End Position	
DCM	113760	Table Lateral End Position	

6.4.22. TID 10004 Accumulated Projection X-Ray Dose

VT	Concept Name	VM	Value Set Constraint	Remarks
NUM	EV(113726, DCM,"Fluoro Dose Area Product Total")	1	Units = EV(Gy.m2, UCUM, "Gy.m2")	Present for Fluoroscopy only
NUM	EV(113728, DCM, "Fluoro Dose (RP) Total")	1	Units = EV(Gy, UCUM, "Gy")	Present for Fluoroscopy only
NUM	EV(113730, DCM, "Total Fluoro Time")	1	Units = EV(s, UCUM, "s")	Present for Fluoroscopy only
NUM	EV(113727, DCM, "Acquisition Dose Area product Total")	1	Units = EV(Gy.m2, UCUM, "Gy.m2")	
NUM	EV(113729, DCM, "Acquisition Dose (RP) Total")	1	Units = EV(Gy, UCUM, "Gy")	
NUM	EV(113855, DCM, "Total Acquisition Time")	1	Units = EV(s, UCUM, "s")	

6.4.23. TID 10007 Accumulated Total Projection Radiography Dose

VT	Concept Name	VM	Value Set Constraint	Remarks
NUM	EV(113722, DCM, "Dose Area Product Total")	1	Units = EV(Gym2, UCUM, "Gym2")	
NUM	EV(113725, DCM, "Dose (RP) Total")	1	Units = EV(Gy, UCUM, "Gy")	
NUM	EV(113731, DCM, "Total Number of Radiographic Frames")	1	Units = EV(1, UCUM, "no units")	
TEXT	EV(113780, DCM, "Reference Point Definition")	1		15cm from Isocenter toward Source

6.5. Data Dictionary of Private Attributes

All private attributes could be deleted from images according to the system configuration.

Tag	VR	Type	Attribute Name	Remarks
(0029,0010)	LO	1C	Frame Time Vector padding Group	
(0029,1002)	DS	1C	Private Time Vector	Not present for Fluoro Last N
(0029,0018):	FL	1	Other IODs' Standard Tags Group	
(0029,1800)	FL	1	Positioner Isocenter Primary Angle	
(0029,1801)	FL	1	Positioner Isocenter Secondary Angle	
(0029,1803)	FL	1	Table X Position to Isocenter	
(0029,1804)	FL	1	Table Y Position to Isocenter	
(0029,1805)	FL	1	Table Z Position to Isocenter	
(0029,1806)	FL	1	Table Horizontal Rotation Angle	
(0029,1807)	FL	1	Table Head Tilt Angle	
(0029,1808)	FL	1	Table Cradle Tilt Angle	
(6B01,0011)	LO	1	SHIMADZU Private Creator	
(6B01,1100)	LO	1C	Rotation Type (3D-DSA, 3D-DA, 3D-RSM, 3D-CB, ROTATION)	Present in rotational acquisition images
(6B01,1101)	CS	1C	Sensor Type: 0=I.I, 1=FPD	Present in rotational acquisition images
(6B01,1102)	CS	1C	08:MH200, 09:MH300, 10:MH200S	Present in rotational acquisition images
(6B01,1103)	DS	1C	Mask Frames Count/Frames Before Rotation/Total Frames	Present in rotational acquisition images
(6B01,1108)	DS	1C	Rotation Speed (degrees/sec)	Present in rotational acquisition images
(6B01,110A)	IS	1C	BH Filter	Present for Rad only.
(6B01,110B)	IS	1	Field of View	
(6B01,1110)	IS	1C	3D Reconstruction Mode	Present in rotational acquisition images
(6B01,1111)	IS	1	FPD Rotation Angle	
(6B01,1180)	OB	1C	mAs	Present in rotational acquisition images

The following tags are never present in Reference and Annotated images(Secondary Capture).

Tag	VR	Type	Attribute Name	Remarks
(0029,0015)	LO	1	Shimadzu General Group	
(0029,1501)	DS	1	Tilting Angle	
(0029,1502)	IS	1	FPD Size	
(0029,1506)	DS	1C	Field Of View	Present in 3D images
(0029,1507)	DS	1C	Distance of Source to Detector	Present in 3D images
(0029,1508)	DS	1C	Distance of Source to Patient	Present in 3D images
(0029,1509)	LO	1	DUP Name	
(0029,1513)	LO	1C	Technique Name	Present in Flex-APS images, EnhancedView images, StentView images, StentShot images, AutoStitching, AutoStitching Result, AutoStitching Discarded, and SPOT DSA.
(0029,1516)	ID	1C	Rad Type	Present in radiography images
(0029,1517)	US	1C	Pre-Processing Horizontal Flip	
(0029,1518)	US	1C	Pre-Processing Vertical Flip	
(0029,1519)	US	1C	Post-Processing String: Proc file at end grab	Present in original DICOM file, not in processed DICOM file. This tag contains the string indicating the default post-processing to do on the image when it is acquired.
(0029,151A)	US	1C	Pre-Processing Sub-Divisional AWL: 0=Normal AWL, 1=Sub AWL	
(0029,151B)	SH	1C	Original ID of C-arm Position	
(0029,151C)	LT	1C	Body thickness	Present for ChaseDSA
(0029,151D)	IS	1C	Double Speed Acquisition	Present for Rad only.
(0029,151E)	IS	1C	Mask Weight	
(0029,1528)	DS	1C	Table Top Vertical Position	Present in 3D images
(0029,1529)	DS	1C	Table Top Longitudinal Position	Present in 3D images
(0029,152A)	DS	1C	Table Top Lateral Position	Present in 3D images
(0029,152D)	DS	1C	Ceiling Travel Longitudinal Position	Present in 3D images
(0029,152E)	DS	1C	Ceiling Travel Transversal Position	Present in 3D images
(0029,152F)	DS	1C	ISO Center Height	Present in 3D images
(0029,1530)	US	1C	Number of StentView ROIs	Present in StentView images and StentShot images
(0029,1531)	US	1C	Rows of Proximal ROI	Present if (0029,1530) is present and if there is at least 1 region of interest.
(0029,1532)	US	1C	Columns of Proximal ROIs	Present if (0029,1530) is present and if there is at least 1 region of interest.
(0029,1533)	LO	1C	Position of Proximal ROI	Present if (0029,1530) is present and if there is at least 1 region of interest.

(0029,1534)	US	1C	Rows of Distal ROI	Present if (0029,1530) is present and if there is at least 2 regions of interest.
(0029,1535)	US	1C	Columns of Distal ROI	Present if (0029,1530) is present and if there is at least 2 regions of interest.
(0029,1536)	LO	1C	Position of Distal ROI	Present if (0029,1530) is present and if there is at least 2 regions of interest.
(0029,1537)	UT	1	Additional information on the StentView acquisition	Present in EnhancedView images,, StentView images and StentShot images
(0029,1550)	UT	1	Stored frames geometry information	