

SwissVision TR4000

DICOM Conformance Statement
Storage Services

Program Version 9.3 or later
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Document Revision History

Version	Changes	SwissVision	Author	Date
1.0	First release version	V 5.3	R. Conrad	09.04.98
1.1	Swissray UID added	V 6.0 or later	R. Conrad	11.08.98
1.2	AE title adaptable	V 6.0.2 or later	E. Ungricht	14.05.99
1.3	Additional and private attributes updated	V 6.3 or later	E. Ungricht	26.06.00
1.4	DX Storage SOP Class support added	V 8.0 or later	E. Ungricht	20.04.01
1.5	Key Object Selection Document SOP Class and Grayscale Softcopy Presentation State Storage SOP Class support added	V 8.0 or later	E. Ungricht	08.07.02
1.6	Extended Character set updated "Store to Multiple Provider" added Private tables 4, 5, 6, 7 and 8 updated Added table 10 "Key Image Note"	V 9.3 or later	M. Darms	22.03.06

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0 Introduction

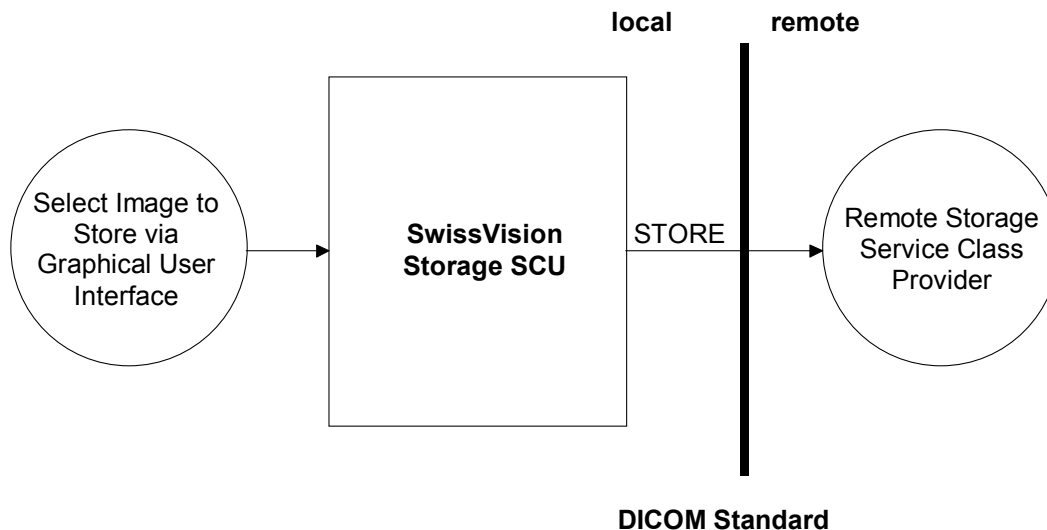
This is the conformance statement for the SwissVision “Storage” application which supports DICOM 3.0 Storage Services as a Service Class User (SCU). This conformance statement is valid for the Swiss Vision V 9.3 and higher.

1 Implementation Model

The SwissVision “Storage” application is an implementation of a DICOM Storage Service Class User (SCU) which can send DICOM images to a DICOM Storage Service Class Provider (SCP). It is realized using the MergeCOM-3 Advanced Integrator’s Tool Kit from Merge Technologies Inc.

1.1 Application Data Flow Diagram

Figure 1: SwissVision “Storage” application data flow diagram



1.2 Functional Definition of Application Entity (AE)

The SwissVision “Storage” application allows sending DICOM CR and DX images to a DICOM archive or viewing station. It allows the user to select the images to be archived and the storage provider with the graphical user interface. In addition, there is a functionality called “Store to Multiple Provider” which allows to send the images to more than one provider with only one procedure.

The application establishes an association with the user selected storage SCP just prior to sending a store request to that AE.

All communication and image transfer with the remote application is accomplished utilizing the DICOM protocol over a network using the TCP/IP protocol stack.

1.3 Sequencing of real-world Activities

Not applicable.

2 AE Specifications

2.1 SwissVision "Storage"

The SwissVision "Storage" application provides standard conformance to the following DICOM 3.0 Service Object Pair (SOP) Classes as a Storage Service Class User (SCU).

Table 1: Valid SOP Classes for the SwissVision "Storage" application

SOP Class Name	SOP Class UID
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59

2.1.1 Association Establishment Policies

2.1.1.1 General

The SwissVision "Storage" application initiates an association as a Storage SCU when the local operator requests to send images over the network to a remote DICOM storage provider. The maximum PDU size is 28'672 bytes.

2.1.1.2 Number of Associations

The SwissVision "Storage" application opens only one association at a time. Several Images without or with Grayscale Softcopy Presentation States and Key Object Selection Documents may be sent per association.

2.1.1.3 Asynchronous Nature

The SwissVision "Storage" application does not support asynchronous communication (multiple outstanding transactions over a single association).

2.1.1.4 Implementation identifying Information

The implementation class unique identifier (UID) for the SwissVision "Storage" application is:

2.16.840.1.113929.1.9.980811

The implementation version name for the SwissVision "Storage" application is:

SwissVision_1.0

2.1.2 Association Initiation by real-world Activity

The SwissVision "Storage" application initiates an association for the appropriate Storage Service Classes that correspond to the Images, Grayscale Softcopy Presentation States and Key Object Selection Documents to be transferred. The association is closed when the Images, Grayscale Softcopy Presentation States and Key Object Selection Documents have been sent to the remote DICOM network node. The client is also able to abort the association when an error occurs.

2.1.2.1 Real-world Activity for Send Operations

The SwissVision "Storage" application initiates associations for the transfer of Images, Grayscale Softcopy Presentation States and Key Object Selection Documents to a DICOM Storage Server.

2.1.2.1.1 Associated real-world Activity for Send Operations

Once the association has been established, the SwissVision "Storage" application sends an store request for the first image and waits for the store response. If present, it sends afterwards store requests for related Grayscale Softcopy Presentation States and Key Object Selection Documents.

2.1.2.1.2 Proposed Presentation Contexts for Send Operations

The presentation contexts that are proposed by the SwissVision "Storage" application for the store operations are specified in Table 2. They correspond to the standard Storage Services as specified in the DICOM Standard.

Table 2: Store Image Presentation Contexts of the SwissVision "Storage" application

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Computed Radiography Image Storage	1.2.840.10008.5.1.4.1.1.1	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	none
Digital X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.1.1	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	none
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	none
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.5 9	DICOM Implicit VR Little Endian DICOM Explicit VR Little Endian DICOM Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	none

3 Communication Profiles

The SwissVision "Storage" application provides TCP/IP network communication support as defined by PS 3.8, on any physical medium supporting the TCP/IP (e.g. Ethernet, etc.).

4 Extension / Specialization / Privatization

4.1 Standard extended / specialized / private SOP's

4.1.1 Computed Radiography and DX Image Storage

The SwissVision "Storage" application stores the following additional image attributes:

Table 3: Additional image attributes stored by the SwissVision "Storage" application

Module Name	Attribute Name	Tag	VR	Attribute Description
Image Plane Module	Pixel Spacing	0028,0030	DS	Pixel Spacing (in mm)
VOI LUT Module	Window Center	0028,1050	DS	Grayscale Window Center
VOI LUT Module	Window Width	0028,1051	DS	Grayscale Window Width

The SwissVision "Storage" application uses some private attributes which are all related to the Swissray X-ray equipment. The attributes are defined in Table 4 to Table 9. The private code is "SVISION".

NOTE: Group and byte numbers are in hexadecimal notation.

Table 4: Private series attributes used by the SwissVision "Storage" application

Attribute Name	Group	Byte	Type	VR	Attribute Description
Extended Body Part	0017	1000	3	LO	Text description of the part of the body part examined. Defined Terms: HUMERUS, FOREARM, FEMURPROX, FEMURDIST, FINGER, WRIST,

Attribute Name	Group	Byte	Type	VR	Attribute Description
					<p>LEGPX, LEGDIST, TOES, DENS, HEAD, SINUS, NASALBONES, FACIALBONES, ZYGOMARCH, JAW, STERNUM, HEART, SCAPULA, PATELLA, HEEL, (CALIBRASTER, FLATFIELD).</p> <p>This private attribute is only used for body parts which are not defined in the standard attribute (0018,0015)</p>
Extended View Position	0017	1010	3	LO	<p>Radiographic view. Defined Terms: AX = Axial</p> <p>This private attribute is only used for view positions which are not defined in the standard attribute (0018,5101)</p>
Images SOP Class	0017	10F0	3	IS	<p>Images SOP Class (0 = CR, 1 = DX, 2 = SC)</p>
Scheduled Procedure Step List	0017	1020	3	SQ	Procedure Code Sequence of Schedules procedures
Fixed Grid System	0017	10A0	3	IS	Fixed or moving grid system.

Table 5: Private equipment and exposure attributes used by the SwissVision "Storage" application

Attribute Name	Group	Byte	Type	VR	Attribute Description
AEC Field	0019	1000	3	IS	AEC Field
AEC Film Screen	0019	1001	3	IS	AEC Film Screen
AEC Density	0019	1002	3	IS	AEC Density
Patient Thickness	0019	1010	3	IS	Patient Thickness (-5 ... +5)
Beam Distance	0019	1018	3	IS	Distance Source to Detector (cm)
Workstation Number	0019	1020	3	IS	Workstation Number
Tube Number	0019	1028	3	IS	Tube Number
Bucky Grid	0019	1030	3	IS	<p>Bucky Grid¹ (0 = No Grid, 1 = Short Grid, 2 = Default Grid, 3 = Long Distance Grid)</p>
Focus	0019	1034	3	IS	Focus (1 = Small, 0 = Large)
Age Group	0019	1038	3	IS	<p>Age Group (0 = Adult, 1 = Baby, 2 = Child, 3 = Youth)</p>
Collimator Distance X	0019	1040	3	IS	Collimator Distance X-Axis (mm)
Collimator Distance Y	0019	1041	3	IS	Collimator Distance Y-Axis (mm)
Bucky Height	0019	1050	3	IS	Central Beam Height above Floor (cm)
Bucky Angle	0019	1060	3	IS	Bucky Angle (degrees)
C-Arm Angle	0019	1068	3	IS	C-Arm Angle (degrees)

¹Valid only for SwissVision XG V1.1 and higher. SwissVisionXG is based on SwissVision V9.3.

Attribute Name	Group	Byte	Type	VR	Attribute Description
Collimator Angle	0019	1069	3	IS	Collimator Angle (degrees)
Filter Number	0019	1070	3	IS	Filter Number
Filter Material 1	0019	1074	3	LO	Filter Material 1
Filter Material 2	0019	1075	3	LO	Filter Material 2
Filter Thickness 1	0019	1078	3	DS	Filter Thickness 1 (mm)
Filter Thickness 2	0019	1079	3	DS	Filter Thickness 2 (mm)
Bucky Format	0019	1080	3	IS	Bucky Format (1= Landscape, 0 = Portrait) ²
Object Position	0019	1081	3	IS	Object Position (0 = Standard, 1 = Extremities Table, 2 = Detector Top)
Desk Command	0019	1090	3	LO	Generator Desk Command
Central Beam X	0019	1091	3	IS	Central Beam X
Central Beam Y	0019	1092	3	IS	Central Beam Y
Tube Turn Angle	0019	1093	3	IS	Tube Turn Angle ³
Stand drive level	0019	1094	3	IS	Stand drive level ⁴
Extended Exposure Time	0019	10A0	3	DS	Exposure Time (msec with 1 decimal) NOTE: The Exposure Time is also written to the standard attribute (0018,1150) but rounded up to the next larger integer.
Actual Exposure Time	0019	10A1	3	DS	Actual Exposure Time after integration (msec)
Extended X-ray Tube Current	0019	10A8	3	DS	X-ray Tube Current (mA with 1 decimal) NOTE: The X-ray Tube Current is also written to the standard attribute (0018,1151) but rounded up to the next larger integer.
Dose Indicator	0019	10B0	3	IS	Range: 0..100
Shift Reference Value	0019	10B1	3	IS	Used if pixel values are shifted

Table 6: Private image processing attributes used by the SwissVision "Storage" application

Attribute Name	Group	Byte	Type	VR	Attribute Description
Noise Reduction	0021	1000	3	DS	Noise Reduction
Contrast Amplification	0021	1001	3	DS	Contrast Amplification
Edge Contrast Boosting	0021	1002	3	DS	Edge Contrast Boosting
Latitude Reduction	0021	1003	3	DS	Latitude Reduction
Find Range Algorithm	0021	1010	3	LO	Find Range Algorithm. Defined Terms: C, P
Threshold C-Algorithm	0021	1011	3	DS	Threshold for 'C' Find Range Algorithm

² For SwissVisionXG obsolete

³ Only for *ddRFormula* Systems

⁴ Only for *ddRCombi Trauma* Systems

Attribute Name	Group	Byte	Type	VR	Attribute Description
Sensometric Curve	0021	1020	3	LO	Sensometric Curve. Defined Terms: LINEAR, E25, NK5, RP1KT
Lower Window Offset	0021	1030	3	DS	Lower Window Offset
Upper Window Offset	0021	1031	3	DS	Upper Window Offset
Min. Printable Density	0021	1040	3	DS	Minimal Printable Density
Max. Printable Density	0021	1041	3	DS	Maximal Printable Density
Min. Window Latitude	0021	1050	3	DS	Min. Window Latitude
Max. Window Latitude	0021	1051	3	DS	Max. Window Latitude
Rel. Window Alignment	0021	1052	3	DS	Relative Window Alignment
Decomposition Layer	0021	1060	3	DS	Decomposition Layer for pediatrics
Brightness	0021	1090	3	DS	Brightness
Contrast	0021	1091	3	DS	Contrast
Shape Factor	0021	1092	3	DS	Shape Factor

Table 7: Private image parameter attributes used by the SwissVision "Storage" application

Attribute Name	Group	Byte	Type	VR	Attribute Description
Image Laterality	0023	1000	3	LO	Image Laterality. Defined Terms: L, R, U, B
Letter Position	0023	1001	3	IS	Letter Position. Possible Values: 0, 1, 2, 3
Burned In Annotation	0023	1002	3	IS	Annotation (1 = present, 0 = Not present)
Image SOP Class	0023	10F0	3	IS	Image SOP Class (0 = CR, 1 = DX, 2 = SC)

Table 8: Private image state attributes used by the SwissVision "Storage" application

Attribute Name	Group	Byte	Type	VR	Attribute Description
Original Image	0025	1000	3	IS	Original Image (1 = original, 0 = not original)
Not Processed Image	0025	1001	3	IS	Not Processed Image (1 = not processed, 0 = processed)
Cut Out Image	0025	1002	3	IS	Cut Out Image (1 = cut out, 0 = full size)
Duplicated Image	0025	1003	3	IS	Duplicated Image (1 = duplicated, 0 = not duplicated)
Stored Image	0025	1004	3	IS	Image stored in Archive (1 = stored in archive, 0 = not stored)
Retrieved Image	0025	1005	3	IS	Retrieved Image (1 = retrieved, 0 = not retrieved)
New Image	0025	1006	3	IS	New Image ⁵ (1 = new received, 0 = viewed)

⁵ Only with option DICOM Storage SCP

Attribute Name	Group	Byte	Type	VR	Attribute Description
Media Stored Image	0025	1007	3	IS	Image stored to Media (1 = stored to media, 0 = not stored)
Image State	0025	1008	3	IS	Image State (Enumerator 0..10)
Image Stitched Manually	0025	1009	3	IS	Only with license for AutoStitching (TM)
Image Stitched Automatically	0025	100A	3	IS	Only with license for AutoStitching (TM)
Source Image File	0025	1020	3	LO	Source Image from which this image was derived
Source UID	0025	1021	3	LO	Source UID from which this image was derived

Table 9: Private patient attributes used by the SwissVision "Storage" application

Attribute Name	Group	Byte	Type	VR	Attribute Description
Number of Series	0027	1000	3	IS	Total Number of Series for Patient
Number of Studies	0027	1001	3	IS	Total Number of Studies for Patient
Oldest Series	0027	1010	3	DT	Date of Oldest Series
Newest Series	0027	1011	3	DT	Date of Newest Series
Oldest Study	0027	1012	3	DT	Date of Oldest Study
Newest Study	0027	1013	3	DT	Date of Newest Study

Table 10: Private patient attributes used by the SwissVision "Key Image Note" option

Attribute Name	Group	Byte	Type	VR	Attribute Description
Key Note Instance UID	0029	1000	3	IS	Key Note Instance UID
Storage State	0029	1001	3	IS	Total Number of Studies for Patient
Referenced Image SOP Class	0029	1002	3	IS	Referenced Image SOP Class
Ref. Image Instance UID	0029	1003	3	LO	Referenced Image Instance UID
Rel. Pres. State Number	0029	1004	3	IS	Related Presentation State Number
Rel. Presentation State UID	0029	1005	3	LO	Related Presentation State UID

4.2 Private Transfer Syntax

None supported.

5 Configuration

5.1 Local Settings

The Local Application Title and the Response Timeout can be entered during setup using the graphical user interface. Default values are "SVISION_ST" for the AE title and 30 seconds for the response timeout.

Normally the CR Image Storage SOP Class is used for image storage. In the IHE option of SwissVision, the DX Image Storage SOP Class can be configured to be used for image storage.

In addition, the Key Object Selection Document SOP Class and the Grayscale Softcopy Presentation State Storage SOP Class can be activated separately in the IHE option of SwissVision.

5.2 Host Properties

The Remote Application Title, Host Name, Remote Port Number and Type of one or more storage providers can be entered during setup using the graphical user interface.

6 Support of Extended Character Sets

The SwissVision "Storage" application supports the following character sets:

- ISO_IR_100 Latin 1
- ISO_IR_101 Latin 2 / Eastern Europe
- ISO_IR_109 Latin 3 / Turkish
- ISO_IR_110 Latin 4 / Baltic
- ISO_IR_126 Greek
- ISO_IR_127 Arabic
- ISO_IR_138 Hebrew
- ISO_IR_144 Cyrillic