

Array 2905 DICOM Scan Pro Plus
Version 1.4E

DICOM V3.0 Conformance Statement

NOTICE AND DISCLAIMER

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0 Introduction

This document describes the conformance of the DICOM Scan Pro Plus implementation to the DICOM Standard, based on the DICOM Standard PS 3.2-2003.

Acronyms and Abbreviations

AE	Application Entity
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
IOD	Information Object Definition
ISO	International Standards Organization
LUT	Lookup Table
NEMA	National Electrical Manufacturers Association
PDU	Protocol Data Unit
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
TCP / IP	Transmission Control Protocol / Internet Protocol
UID	Unique Identifier

Following the DICOM Standard, each reference to the Standard is described, for example, "DICOM Standard V3.0 Part 2" as "PS3.2" in this document.

1 Implementation Model

DICOM Scan Pro Plus implements a function of storing images (Storage SCU), printing images (Print Management SCU) and querying and retrieving study information (Modality Worklist SCU) in the DICOM Standard.

1.1 Application Data Flow

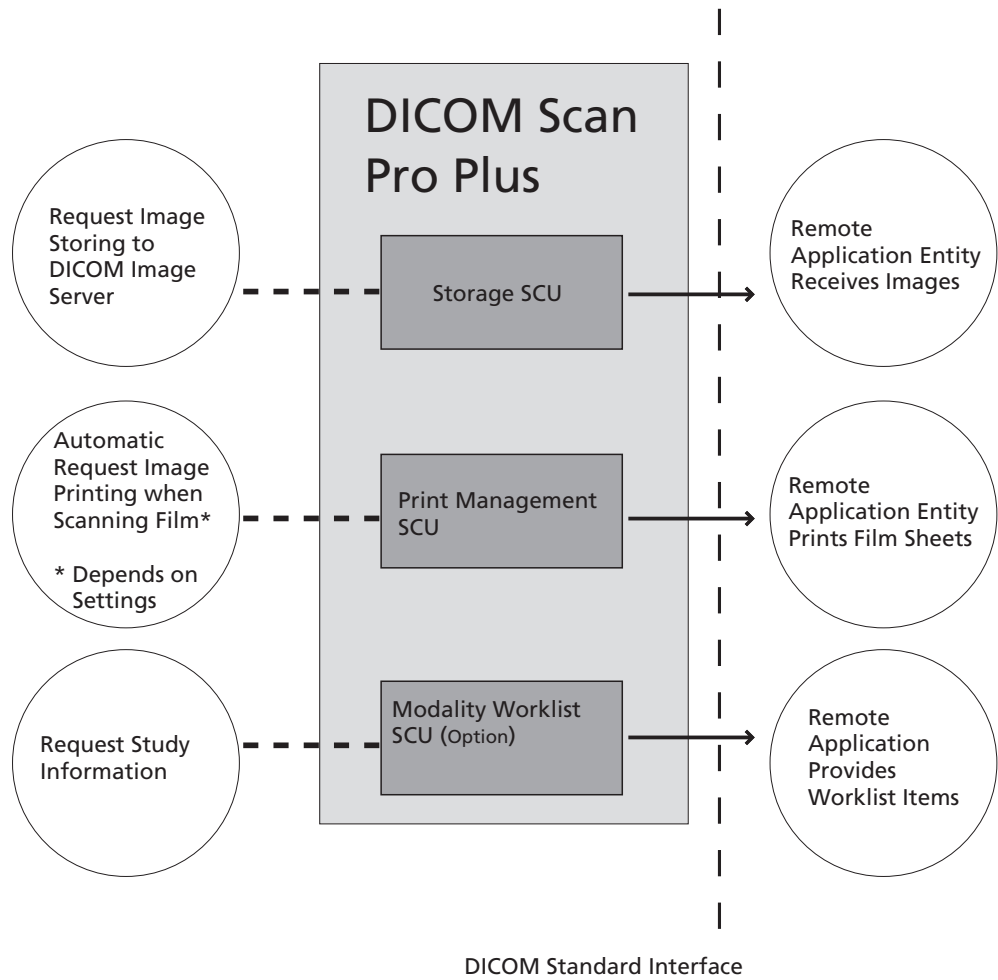


Table 1-1 DICOM Scan Pro Plus Implementation Model

1.2 Functional Definitions of AEs

DICOM Scan Pro Plus operates as Storage SCU, Print Management SCU and Modality Worklist SCU defined PS3.4.

Storage SCU

Will send images to Storage SCP following the procedure defined in PS3.7.

Print Management SCU

Will print images to Print Management SCP following procedure of N-SET DIMSE-N and N-CREATE DIMSE-N services defined in PS 3.7.

Modality Worklist SCU (Option)

Will query and retrieve study information to Modality Worklist Management SCP the following procedure of C-FIND DIMNE-C service defined PS3.7.

1.3 Sequencing of Real-World Activities

Not Applicable.

2 AE Specifications

2.1 DICOM Scan Pro Plus Specifications

DICOM Scan Pro Plus provides Standard Conformance to the following DICOM V3.0

SOP Class Name	SOP Class UID
Storage Service Class	
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Print Management Service Class	
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9
Basic Worklist Management Service Class (Option)	
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31

Table 2-1 Supported SOP Classes as an SCU

2.1.1 Association Establishment Policies

2.1.1.1 General

DICOM Scan Pro Plus will negotiate an association with the AE title and the TCP / IP port number

The maximum PDU size which DICOM Scan Pro Plus is 16KB as the Storage SCU, and 64 KB as the Print Management SCU and Modality Worklist SCU.

2.1.1.2 Number of Associations

DICOM Scan Pro Plus will attempt only one association at a time.

2.1.1.3 Asynchronous Nature

DICOM Scan Pro Plus will only allow a single operation on an association. It does not support negotiation of multiple outstanding transactions.

2.1.1.4 Implement Identifying Information

Implementation Class UID: "1.2.392.200054.30630000.0.2.1.1.4.0.0"

Implementation Version name: "DICOMScanPP1.4"

2.1.2 Association Initiation Policies

In the case of the following real world activities, DICOM Scan Pro Plus will request an initial association to a SCP configured previously.

Request Image Storing(Storage SCU)

When the user manually stores the scanned images to a Storage SCP.

Request Image Printing (Print Management SCU)

After the user scans a film, it will automatically print images to a Print Management SCP.

The user can change the setting not to print automatically.

Request Study Information (Modality Worklist SCU) * Option

When the user manually searches the study information to a Modality Worklist SCP.

2.1.2.1 Storing Images (Storage SCU)

2.1.2.1.1 Associated Real-World Activities

The user sends the scanned images to a Storage SCP configured previously.
If the transmission is failed, the user can modify DICOM information of the images before re-sending.

2.1.2.1.2 Proposed Presentation Contexts

Table 2-3 specifies the presentation contexts used by DICOM Scan Pro Plus.

Presentation Context Table				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
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

Table 2-3 Proposed presentation Contexts (Storage SCU)

2.1.2.1.3 SOP Specific Conformance

Even if DICOM Scan Pro Plus receives a Failed or Warning status of C-STORE message from Storage SCP, it sends next SOP instance without changing any information.

DICOM Scan Pro Plus will not try any extended association.

Table from 2-4 to 2-7 specify the attributes of a secondary capture image transmitted by DICOM Scan Pro Plus.

IOD	Attribute	Tag	Value of Standard Version and Worklist Option	
			Standard Version	Worklist Option
Patient	Patient's Name	(0010,0010)	Manual Input or NULL	Worklist Search
	Patient ID	(0010,0020)	Manual Input or NULL	Worklist Search
	Patient Birth Date	(0010,0030)	Manual Input or NULL	Worklist Search
	Patient's Sex	(0010,0040)	Manual Input or NULL	Worklist Search
	Patient's Age	(0010,1010)	Empty	
	Patient's Size	(0010,1020)	Empty	
	Patient's Weight	(0010,1030)	Empty	
	Additional Patient History	(0010,21B0)	Manual Input or NULL	
General Study	Study Instance UID	(0020,000D)	Auto	Worklist Search
	Study Date	(0008,0020)	Manual Input or NULL	Worklist Search
	Study Time	(0008,0030)	Manual Input or NULL	Worklist Search
	Study ID	(0020,0010)	Manual Input or NULL	
	Accession Number	(0008,0050)	Manual Input or NULL	Worklist Search
	Study Description	(0008,1030)	Manual Input or NULL	Worklist Search
	Referring Physician's Name	(0008,0090)	Manual Input or NULL	Worklist Search
	Name of Physician(s) Reading	(0008,1060)	Manual Input or NULL	
Study				

Table 2-4 the attributes of a secondary capture image transmitted by DICOM Scan Pro Plus (Storage SCU)

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IOD	Attribute	Tag	Value of Standard Version and Worklist Option	
			Standard Version	Worklist Option
Patient Study	Admitting Diagnoses Description	(0008,1080)	Empty	
General Series	Modality	(0008,0060)	Manual Input or NULL	Worklist Search
	Body Part Examined	(0018,0015)	Manual Input or NULL	
	Patient Position	(0018,5100)	Manual Input or NULL	
	Series Instance UID	(0020,000E)	Auto	
	Series Number	(0020,0011)	Auto	
	Laterality	(0020,0060)	Manual Input or NULL	
General Equipment	Manufacturer	(0008,0070)	Empty	
	Institution Name	(0008,0080)	Manual Input or NULL	
SC Equipment	Conversion Type	(0008,0064)	"DF"	
	SC device Manufacturer	(0018,1016)	"Array Corporation"	
General Image	Instance Number	(0020,0013)	Auto	
	Patient Orientation	(0020,0020)	Empty	
	Content Date	(0008,0023)	Empty	
	Content Time	(0008,0033)	Empty	
Image Plane	Pixel Spacing	(0028,0030)	If the user configure to include this attribute : Auto	
Image Pixel	Sample per pixel	(0028,0002)	1	
	Photometric Interpretation	(0028,0004)	"MONOCHROME2"	
	Rows	(0028,0010)	Height of Image	
	Columns	(0028,0011)	Width of Image	
	Bits allocated	(0028,0100)	16,8	
	Bits stored	(0028,0101)	12,10,8	
	High bit	(0028,0102)	11,9,7	
	Pixel Representation	(0028,0103)	0	
SC Image	Data of secondary capture	(0018,1012)	Auto	
	Time of secondary capture	(0018,1014)	Auto	
X-RAY Acquisition	Imager Pixel Spacing	(0018,1164)	If the user configure to include this attribute : Auto	
SOP Common	SOP Class UID	(0008,0016)	Auto	
	SOP Instance UID	(0008,0018)	Auto	
	Specific Character Set	(0008,0005)	ISO_IR_100	

Table 2-4 the attributes of a secondary capture image transmitted by DICOM Scan Pro Plus

IOD	Attribute	Tag	Value of LUT settings			
			NO LUT	DICOM PS 3.14 LUT	DICOM PS 3.14 Conversion	lut12_g24
Modality LUT	Modality LUT	(0028,3000)	Not in Use		Not in Use	Not in Use
	Sequence					
	>LUT Descriptor	(0028,3002)	Not in Use	Auto	Not in Use	Not in Use
	>Modality LUT	(0028,3004)	Not in Use	US	Not in Use	Not in Use
	Type					
	>LUT Data	(0028,3006)	Not in Use	Auto	Not in Use	Not in Use
	Rescale Intercept	(0028,1052)	0	Not in Use	0	0
Rescale Slope	(0028,1053)	1	Not in Use	1	1	
Rescale Type	(0028,1054)	US	Not in Use	US	US	
VOI LUT	Window Center	(0028,1050)	Auto	Auto	Auto	Auto
	Window Width	(0028,1051)	Auto	Auto	Auto	Auto
Presentation LUT	Min Density	(2010,0120)	Not in Use	0	0	Not in Use
	Max Density	(2010,0130)	Not in Use	100, 200, 300, 400, 470	100, 200, 300, 400, 470	Not in Use

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IOD	Attribute	Tag	Value of LUT settings			
			NO LUT	DICOM PS 3.14 LUT	DICOM PS 3.14 Conversion	lut12_g24
SC Multi-frame Image	Illumination	(2010,015E)	Not in Use	Manual Input	Manual Input	Not in Use
	Reflected	(2010,0160)	Not in Use	Manual Input	manual Input	Not in Use
	Ambient Light					

Table 2-5 the attributes of a secondary capture image transmitted by DICOM Scan Pro Plus (LUT configuration versions)

Table 2-6 specifies the added attributes for Mammography support option.

Mammography Support Option			
IOD	Attribute	Tag	Value
General Image	Patient Orientation	(0020, 0020)	Manual Input
Mammography Image	Image Laterarity	(0020,0062)	Manual Input
	View Code Sequence	(0054,0220)	
	>Code Value	(0008,0100)	Manual Input
	>Coding Scheme Designator	(0008,0102)	Manual Input
	>Code Meaning	(0008,0104)	Manual Input

Table 2-6 the added attributes of a secondary capture image transmitted by DICOM Scan Pro Plus (Mammography support option)

Table from 2-7 specifies the PRIVATE attributes of an secondary capture image transmitted by DICOM Scan Pro Plus.

All Versions			
Tag	VR	Type	Value
(0019,0030)	LO	3	Auto
(0019,3000)	US		
(0019,3010)	US		
(0019,3011)	US		
(0019,3012)	US		
(0019,3013)	US		
(0019,3014)	US		
(0019,3015)	UL		
(0019,3016)	UL		
(0019,3017)	US		
(0019,3020)	US		
(00FF,0030)	LO		
(00FF,30FF)	OB		

Table 2-7: the Private Attributes used by DICOM Scan Pro Plus (all versions)

2.1.2.2 Printing Images (Print Management SCU)

2.1.2.2.1 Associated Real-World Activities

After the user scans a film, it automatically prints images to a Print Management SCP. The user can change the setting not to print automatically.

2.1.2.2.2 Proposed Presentation Contexts

Table 2-8 specifies the presentation contexts used by DICOM Scan Pro Plus.

Presentation Context Table				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Implicit VR Little Endian (1.2.840.10008.1.2)	SCU	None

Table 2-8 Proposed Presentation Contexts (Print Management SCU)

2.1.2.2.3 SOP Specific Conformance

DICOM Scan Pro Plus supports the following SOP Classes which are included in the Basic Grayscale Print Management Meta SOP Class. All of them are mandatory classes and any optional SOP Classes are NOT supported.

Name	UID
Basic Film Session SOP class	1.2.840.10008.5.1.1.1
Basic Film Box SOP class	1.2.840.10008.5.1.1.2
Basic Grayscale image box SOP class	1.2.840.10008.5.1.1.4

Table 2-9 Supported SOP Classes (Print Management SCU)

DICOM Scan Pro Plus supports the following DIMSE-N services and attributes.

SOP class	DIMSE Service	Attribute Name	Tag
Basic Film Session SOP Class	N-CREATE	Number of copies	(2000,0010)
		Print Priority	(2000,0020)
		Medium type	(2000,0030)
		Film Destination	(2000,0040)

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SOP class	DIMSE Service	Attribute Name	Tag
Basic Film Box SOP class	N-CREATE	Image Display Format	(2010,0010)
		Referenced Film Session Sequence	(2010,0500)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)
		Film Orientation	(2010,0040)
		Film Size ID	(2010,0050)
		Magnification type	(2010,0060)
		Max density	(2010,0130)
		Configuration Information	(2010,0150)
		Smoothing Type	(2010,0080)
		Border Density	(2010,0100)
		Min density	(2010,0120)
		Trim	(2010,0140)
		N-ACTION	
Basic Grayscale Image Box SOP Class	N-SET	Basic Grayscale Image Sequence	(2020,0110)
		>Samples per Pixel	(0028,0002)
		>Photometric Interpretation	(0028,0004)
		>Rows	(0028,0010)
		>Columns	(0028,0011)
		>Bits Allocated	(0028,0100)
		>Bits Stored	(0028,0101)
		>High Bit	(0028,0102)
		>Pixel Representation	(0028,0103)
		>Pixel Data	(7FE0,0010)
		Polarity	(2020,0020)
		Requested Image Size	(2020,0030)

Table 2-10: Supported DIMSE-N Services and Attributes (Print Management SCU)

DICOM Scan Pro Plus prints images using the data in "Value" row.

DIMSE Service	Attribute Name	Tag	Value
N-CREATE	Number of copies	(2000,0010)	1
	Print Priority	(2000,0020)	MED
	Medium type	(2000,0030)	PAPER, CLEAR FILM, BLUE FILM*1
	Film Destination	(2000,0040)	PROCESSOR
	Image Display Format	(2010,0010)	(STANDARD \ 1,1)
	Referenced Film Session Sequence	(2010,0500)	
	>Referenced SOP Class UID	(0008,1150)	
	>Referenced SOP Instance UID	(0008,1155)	
	Film Orientation	(2010,0040)	PORTRAIT
	Film Size ID	(2010,0050)	8INX10IN, 8_5INX11IN, 10INX12IN, 10INX14IN, 11INX14IN, 11INX17IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM, A4, A3, A2, A1, LA, LA4, XLA4, XLW*1
	Magnification type	(2010,0060)	CUBIC
	Max density	(2010,0130)	300
	Configuration Information	(2010,0150)	
	Smoothing Type	(2010,0080)	SMOOTH
	Border Density	(2010,0100)	BLACK
Min density	(2010,0120)	20	
Trim	(2010,0140)	NO	
N-SET	Basic Grayscale Image Sequence	(2020,0110)	
	>Samples per Pixel	(0028,0002)	
	>Photometric Interpretation	(0028,0004)	
	>Rows	(0028,0010)	
	>Columns	(0028,0011)	
	>Bits Allocated	(0028,0100)	
	>Bits Stored	(0028,0101)	
	>High Bit	(0028,0102)	
	>Pixel Representation	(0028,0103)	
	>Pixel Data	(7FE0,0010)	
	Polarity	(2020,0020)	NORMAL
	Requested Image Size	(2020,0030)	*2

*1 The actual configurable data depends on the imager.

*2 The actual setting (supported / non-supported) depends on the imager.

Table 2-11: Supported Attributes and Values (Print Management SCU)

2.1.2.3 Querying and Retrieving Study information (Modality Worklist SCU)

* Option

2.1.2.3.1 Associated Real-World Activities

When editing the values of DICOM attributes of images, the user queries study information to the Modality Worklist SOP Class SCP previously configured. The user uses a search key manually entered. The retrieved study informations are set to DICOM attributes.

2.1.2.3.2 Proposed Presentation Contexts

DICOM Scan Pro Plus will propose the following presentation contexts.

Presentation Context Table				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian (1.2.840.10008.1.2)	SCU	None

Table 2-1: Proposed Presentation Contexts (Modality Worklist SCU)

2.1.2.3.3 SOP Specific Conformance

DICOM Scan Pro Plus queries the following information to the Modality Worklist SOP Class SCP.

Description / Module	Tag	Matching Key Type	Return Key Type
Scheduled Procedure Step			
Scheduled Procedure Step Sequence	(0040,0100)	R	1
> Scheduled Station AE Title *1	(0040,0001)	R	1
> Scheduled Procedure Step Start Date*2	(0040,0002)	R	1
> Scheduled Procedure Step Start Time*2	(0040,0003)	R	1
> Modality	(0008,0060)	R	1
> Scheduled Procedure Step Description*2	(0040,0007)	O	1C
Requested Procedure			
Study Instance UID *2	(0020,000D)	O	1
Imaging Service Request			
Accession Number	(0008,0050)	O	2
Referring Physician's Name	(0008,0090)	O	2
Patient Identification			
Patient's Name	(0010,0010)	R	1
Patient ID	(0010,0020)	R	1
Patient Demographic			
Patients Birth Date	(0010,0030)	O	2
Patient's Sex	(0010,0040)	O	2

*1 Client AE title of DICOM Scan Pro plus is always used for the value of Scheduled Station AE Title. Client AT title is configurable(for details, refer to the user's guide).

*2 They are not used for search key. However, DICOM Scan Pro Plus retrieves the return value from the Modality Worklist SCP.

Table 2-13: Information Which DICOM Scan Pro Plus Queries

When the user cancels to query, DICOM Scan Pro Plus sends C-CANCEL-FIND-RQ message.

DICOM Scan Pro Plus closes the association after receiving the last C-FIND-RSP or C-FIND-RSP including query finish status.

3 Communication Profiles

3.1 Supported Communication Stacks

DICOM Scan Pro Plus supports DICOM V 3.0 TCP / IP network communication defined in PS 3.8.

3.2 TCP / IP Stack

DICOM Scan Pro Plus inherits its TCP / IP stack from the Windows operating system upon which it executes. Refer to the user's guide for the supported versions of Windows.

3.2.1 Physical Media Support

DICOM Scan Pro Plus is indifferent to the physical medium over which TCP / IP executes; it inherits this from the Windows operating system upon which it executes.

Refer to the user's guide for the supported versions of Windows.

4 Extensions / Specializations / Privatizations

4.1 SOPs Extended / Specialized / Privatized

DICOM Scan Pro Plus uses type 3 private attributes for Storage Service Class's SOP.

Therefore, this SOP is Extended SOP Class (the name and UID is the same)

For details of the private attributes, refer to the Table 2-7.

4.2 Private Transfer Syntax

DICOM Scan Pro Plus does not use a Private Transfer Syntax.

5 Configuration

DICOM Scan Pro Plus may be configured on the user interface. Refer to the DICOM Scan Pro Plus user's guide for the description of the configuration.

5.1 AE Title and Presentation Address Mapping

DICOM Scan Pro Plus will obtain the presentation address with the "AE title", the "host name".

5.2 Configurable Parameters

The following parameter may be configurable for DICOM Scan Pro Plus.

- AE Title

The following parameters may be configurable for the remote AE.

- AE Title
- Host Name
- TCP / IP Port Number

6 Support for Extended Character Sets

DICOM Scan Pro Plus supports ISO-IR 100.

7 Codes and Controlled Terminology

None.

8 Security Profiles

None.