

DICOM
Conformance Statement

DICOM Pro Plus
as an
SCU

Array Corporation

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0. Introduction

This DICOM conformance statement describes Array Corporation's implementation of DICOM 3.0 output of its' DICOM Pro Plus, later referred to as ICV.

This DICOM Pro Plus is a system that converts images and related information from a proprietary data format to a format conformant to the DICOM 3.0 standard.

Two types of output are supported at the same time: Storage class and Print Management Class. Both of these types are described in separate chapters in this conformance statement.

For information which can not be captured from the proprietary data format a touch-screen keypad is used to have the operator supply it to the system.

1. Implementation model

A non-DICOM diagnostic imaging scanner transmits its image data to the DICOM Pro Plus (ICV) in a proprietary mode. Depending on selection made one or both of the following actions is taken:

- The proprietary image data is converted to the appropriate DICOM format and transferred to a DICOM compliant server that is a Storage Service Class provider for the Secondary Capture SOP class. The ICV utilizes the Storage services of DICOM.
- The proprietary image data is converted to the appropriate DICOM format and transferred to a DICOM compliant server that is a Print Management Service Class provider.

1.1 Application data flow diagram

The ICV Image Send AE requests image storage services of a DICOM server over an association. When the ICV receives a new set of images, the ICV Send Image AE initiates association negotiation with a storage server over the network. If the association is accepted by the server, images are then transferred from the storage client to the storage server over the association. When the transfer is completed, the ICV Send Image AE closes the association.

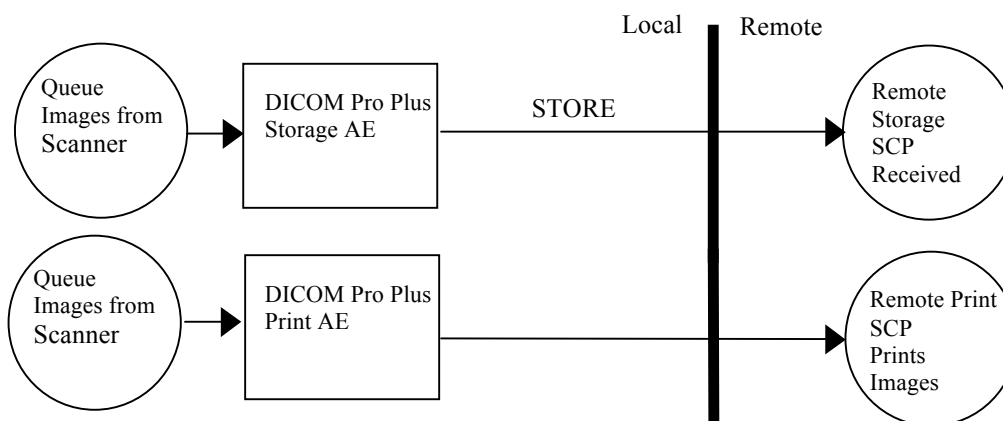


Figure 1. Application data flow diagram for ICV AE's

1.2 Functional definition of Application Entities (AE's)

The ICV Storage AE reads DICOM objects from an internal queue and handles the association related and image storage tasks.

The ICV Print AE manipulates the DICOM Print Management Service Classes to issue print requests to one SCP. The ICV Print AE is implemented as a single AE communicating with a SCP.

1.3 Sequencing of real-world activities

First the ICV needs patient and study information before it can acquire images from the Diagnostic Imaging Scanner. This information is obtained using a keypad.

Once this information is complete the images can be acquired using a proprietary image transfer protocol. This can with or without host-control.

After every page of images has received the print action the images are queued in the ICV.

The Storage AE will initiate a Store request for every image in the queue.

The Print AE will send all information, retrieved from queue, needed to print a film to a Print Management SCP.

2. AE specifications

2.1 Storage AE specification

The ICV Storage AE provides Standard Conformance to the following DICOM 3.0 Storage Service Object pair (SOP) Classes as a Service Class User (SCU):

SOP Class UID	SOP Class Name
1.2.840.10008.5.1.4.1.1.7	Secondary Capture Image Storage

Table 1 - Valid SCU Storage SOP classes for ICV Storage AE.

2.1.1 Association establishment policies

2.1.1.1 General

The ICV Storage AE will act as an SCU of Storage Services when an image transfer request to a remote DICOM network node has been negotiated.

2.1.1.2 Number of associations

The ICV Storage AE will open and maintain single associations. If a valid association is open, it must first be closed before a new association can be opened.

However it is possible to have multiple (maximum of 4) Storage AE's working at the same time. Each Storage AE should be configured to send to a different remote DICOM network node.

2.1.1.3 Asynchronous nature

The ICV Storage AE does not support asynchronous communication.

2.1.1.4 Implementation identifying information

The ICV provides a single Implementation Class UID of

- “1.2.392.00200054.01.0001”

and an implementation version name of

- “InputConvV10”

2.1.2 Association initiation by real_world activity

The ICV Storage AE initiates an associate each time a image is stored in the queue of the ICV. If a previous association is still open when a new image is queued, that association is not closed. The association is closed when no images are in queue left.

2.1.2.1 Real World activity

The ICV Storage AE initiates associations for the transfer of images to a DICOM Image Storage Server. The images which can be transferred are of type : Secondary Capture SOP Class.

2.1.2.2 Proposed presentation contexts

The presentation contexts that can be proposed by the ICV Storage AE for the send Image operation are specified in table 2.

All of these SOP classes conform to the standard Storage Services as specified in the DICOM Standard.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Table 2. Storage AE Presentation Context

2.1.2.3 SOP Specific Conformance Statement

The ICV Storage AE can send the following elements:

IOD	Attribute	Tag	Remarks
Patient	Patient’s Name	0010:0010	*ocr

	Patient ID	0010:0020	*ocr
	Patient Birth Date	0010:0030	*ocr
	Patient Sex	0010:0040	*ocr
General Study	Study Instance UID	0020:000D	
	Study Date	0008:0020	*ocr
	Study Time	0008:0030	
	Referring Physician's Name	0008:0090	
	Study ID	0020:0010	
	Accession Number	0008:0050	
	Study Description	0008:1030	
General Series	Modality	0008:0060	
	Series Instance UID	0020:000E	
	Series Number	0020:0011	
	Series Date	0008:0021	
	Series Time	0008:0031	
General Equipment	Manufacturer	0008:0070	
SC Equipment	Conversion Type	0008:0064	
	SC device Manufacturer	0018:1016	
	SC device manufacturer's model name	0018:1018	
	SC Device Software Version	0018:1019	
General Image	Image Number	0020:0013	
	Acquisition date	0008:0022	
	Acquisition Time	0008:0032	
Image Pixel	Sample 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	
SC Image	Data of secondary capture	0018:1012	
	Time of secondary capture	0018:1014	
SOP Common	SOP Class UID	0008:0016	
	SOP Instance UID	0008:0018	

2.1.3 Association acceptance policy

The ICV Storage AE does not accept associations

2.2 *Print AE specification*

The ICV Print AE provides Standard Conformance to the following DICOM 3.0 Basic Grayscale Print Management Service Object pair (SOP) Classes as a Service Class User (SCU):

SOP Class UID	SOP Class Name
1.2.840.10008.5.1.1.9	Basic Grayscale Print Management Meta SOP Class

Table 3 - SOP Class supported by Print AE as an SCU.

The Print AE represents a single application entity. It acts independently of other DICOM applications that may be running on the same system. The Print AE can be invoked multiple times on the same system and with different AE titles.

2.2.1 *Association establishment policies*

2.2.1.1 *General*

The ICV Print AE will act as an SCU of Basic Print Grayscale management when an image transfer request to a remote DICOM network node has been negotiated.

The Maximum PDU size that can be accepted and offered is 32 KB.

2.2.1.2 *Number of associations*

The ICV Print AE will open and maintain single associations. If a valid association is open, it must first be closed before a new association can be opened.

However it is possible to have multiple (maximum of 4) Print AE's working at the same time. Each Storage AE should be configured to send to a different remote DICOM network node.

2.2.1.3 *Asynchronous nature*

The ICV Print AE is able to handle asynchronous N-EVENT messages.

2.2.1.4 *Implementation identifying information*

The ICV provides a single Implementation Class UID of

■ "1.2.392.00200054.01.0001"

and an implementation version name of

■ "InputConvV10"

2.2.2 Association initiation policy

The ICV Print AE initiates an associate as soon as the AE starts. When the association request fails it will retry requesting an association after a configurable time-out.

The association will not be closed when no data has to be transferred.

Only after any failure in the printing of data or program termination the association will be closed. After a failure the association will be reopened to retry the print cycle.

2.2.2.1 *Real World activity*

When the printing of a page of data is initiated using the user interface (keypad) or by host-control The ICV Print AE will start transferring image data as specified for the Basic Grayscale Print Service Class as a SCU. The print parameters are acquired from the host interface or from the user interface.

2.2.2.2 Proposed presentation contexts

The presentation contexts that can be proposed by the ICV Print AE are specified in table 4.

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

Table 4. Print AE Presentation Context

2.2.2.3 SOP Specific Conformance Statement

The Print AE supports the following mandatory SOP classes which are defined under the Basic Grayscale Print Management Meta SOP Class.

Name	UID
Basic Film Session SOP class	1.2.840.10008.5.1.1
Basic Film Box SOP class	1.2.840.10008.5.1.2
Basic Grayscale image box SOP class	1.2.840.10008.5.1.4
Printer SOP class	1.2.840.10008.5.1.14

Table 5 Mandatory Print SOP Classes supported by print manager

The Print AE does not support any optional SOP classes.

The Print AE supports the following SOP class attributes and DIMSE services.

SOP class	Optional attribute	tag	DIMSE Service
Basic Film Session SOP Class	Number of copies	2000,0010	N_CREATE
	Print Priority	2000,0020	
	Medium type	2000,0030	
	Film Destination	2000,0040	
	Film Session Label	2000,0050	
Basic Film Box SOP class	Film Orientation	2010,0040	N_CREATE
	Film Size ID	2010,0050	
	Magnification type	2010,0060	
	Smoothing Type	2010,0080	
	Border Density	2010:0100	
	Min density	2010,0120	
	Max density	2010,0130	
	Trim	2010,0140	
	Configuration Info	2010:0150	
Basic Grayscale Image Box SOP Class	Polarity	2020,0020	N-SET
	Image Position	2020:0010	
	Preformatted Grayscale Image Sequence (for details see IOD Image Pixel in paragraph 2.1.2.3)	2020:0110	

Table 6. Option SOP class Attributes / DIMSE Services supported by Print AE

2.2.3 Association acceptance policy

The ICV Print AE does not accept associations

3. Communication profiles

The ICV application entities run over the TCP/IP protocol stack on any physical interconnection media supporting the TCP/IP stack.

4. Extensions/Specializations/privatizations

4.1 Standard extended/Specialized/Private SOPs

None supported

4.2 Private transfer syntaxes

None supported

5. Configuration

The ICV AE's reference one initialization file (icv.ini) which is present in the directory from which they run (default: /icv).

5.1 AE title/presentation address mapping

Presentation address mapping is configured in the icv.ini file, where the client and server role parameters are specified.

For SCU and SCP the application name, port and node can be specified.

5.2 Configurable parameters

There are a lot of parameters which can be configured in the icv.ini file. Most of these parameters should never be changed. Doing so can result in miss operation.

6. Support of extended character sets

Non supported