

PACSGEAR, INC.



PacsSCAN Film™

DICOM 3.0 Conformance Statement

February 11, 2010

PG-ENG-PSF-DCS-REVA

PACSGEAR, INC.

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**Any Comments or questions regarding the contents of this document
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Revision History

Date	Revision	Author(s)	Description
9/17/2004	A	Chris Barnett	Created. Based on PacsSCAN Conformance Statement
9/3/2005	B	Chris Barnett	Updated with Mammography fields and updates
2/11/2010	A	Todd Wysuph	General updates reflecting version 3.3 and new part number

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1 Introduction

This conformance statement is designed to communicate technical information about the PacsSCAN FILM product and its compliance to the DICOM 3.0 standard. PacsSCAN FILM is designed to import film and paper documents using an off the shelf film digitizer or paper scanner, and send them to various PACS components via DICOM. Patient demographics are either entered by the user, or can be selected using DICOM Modality Worklist or DICOM Study Root Query/Retrieve-Find functionality. PacsSCAN FILM can also be configured to act as a film duplication station by sending the digitized film images to a DICOM printer.

2 Implementation Model

2.1 Application Data Flow Diagram

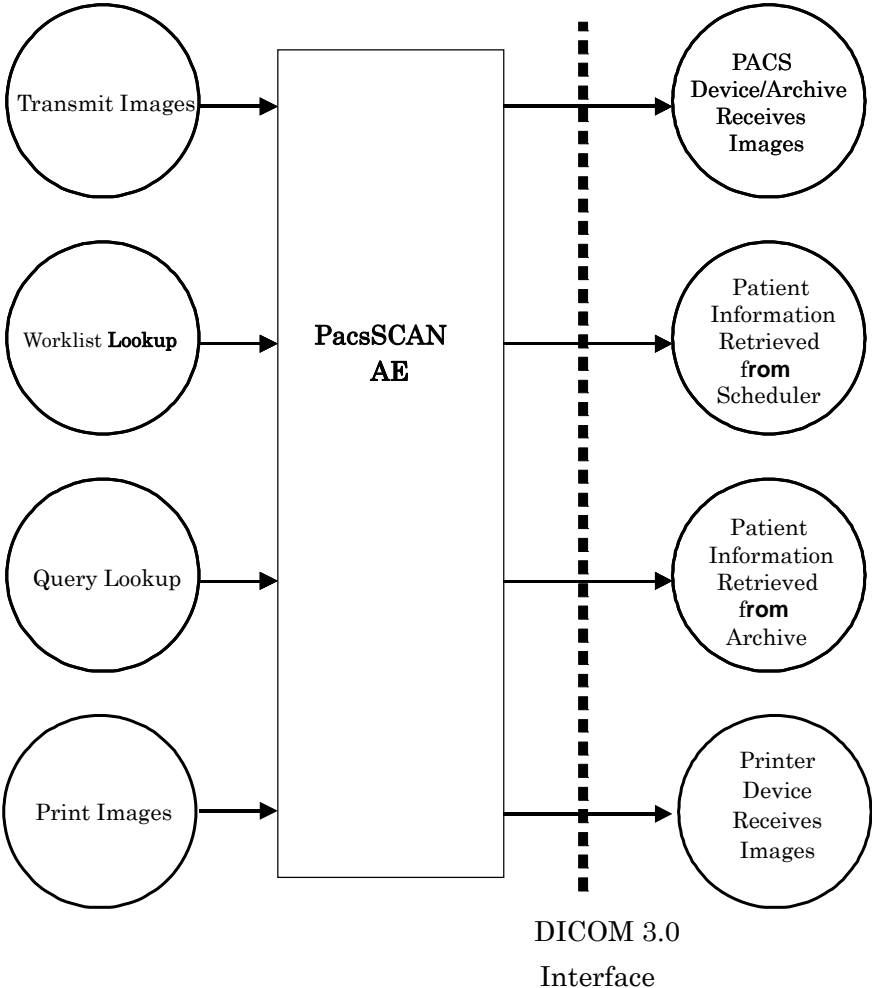


Figure 1. PacsSCAN Implementation Model

PacsSCAN (Film) acquires an image from a film digitizer or paper scanner and transmits it to a PACS device. Patient demographic information can be entered manually, or it can be downloaded from an external scheduling system via DICOM Modality Worklist or an archive via DICOM Study Root Query/Retrieve (Q/R)-Find requests. PacsSCAN may also be utilized as a film copy device by acquiring an image from the digitizer and printing one or more images to a DICOM print device.

2.2 Functional Definition of AE's

The PacsSCAN Application Entity supports the following three SCU functions (one at a time):

- **Transmit Images**
This AE is responsible for the management of DICOM Storage SCU activities.
- **Worklist Lookup**
This AE provides patient demographic and study information lookups utilizing DICOM Modality Worklist requests as an SCU.
- **Query Lookup**
This AE provides patient demographic and study information lookups utilizing DICOM Study Root Q/R-Find requests as an SCU.
- **Print Images**
This AE is responsible for the management of DICOM Print SCU activities.

2.3 Sequencing of Real-World Activities

Not Applicable.

3 AE Specifications

3.1 PacsSCAN AE Specifications

The PacsSCAN AE provides standards conformance to the following DICOM 3.0 SOP classes as an SCU.

SOP Class Name	SOP Class UID
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Digital Mammography X-Ray Image Storage – for Presentation	1.2.840.10008.5.1.4.1.1.1.2
Modality Worklist	1.2.840.10008.5.1.4.31
Study Root Q/R Information Model – Find	1.2.840.10008.5.1.4.1.2.2.1
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9
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 Gray Image Box SOP Class	1.2.840.10008.5.1.1.4

3.1.1 Association Establishment Policies

3.1.1.1 General

The maximum PDU size for any association establishment that is offered is 16 Kbytes.

3.1.1.2 Number of Associations

The PacsSCAN AE will only establish one association at a time.

3.1.1.3 Asynchronous Nature

The PacsSCAN AE does not support asynchronous communication.

3.1.1.4 Implementation Identifying Information

The implementation identifying information for this DICOM 3.0 implementation is:

Implementation Class UID	1.2.7741.122
Version Name	pacsgear_dicom

Figure 2. Implementation Identifying Information

3.1.2 Association Initiation by Real-World Activity

3.1.2.1 Real-World Activity – Transmit Images

3.1.2.1.1 Associated Real-World Activity

After a user has scanned one or more paper documents into the PacsSCAN system, the user will then click the Send button. The PacsSCAN AE will request an association with a single configured AE. PacsSCAN will then transmit all of the images over this association, and will request an association release.

3.1.2.1.2 Presentation Contexts

Proposed 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	SCU	None
Digital Mammography X-Ray Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.1.2	Implicit VR Little Endian	SCU	None

Figure 3. Presentation Context Table – Transmit Images

3.1.2.1.2.1 SOP Conformance for Secondary Capture Image Storage

Standard conformance is provided to the DICOM Secondary Capture Image Storage Service class. For specific attributes utilized during this operation please refer to Appendix A.

3.1.2.1.2.2 SOP Specific Conformance for Digital Mammography X-Ray Image Storage – for Presentation

Standard conformance is provided to the DICOM Digital Mammography X-Ray Image Storage – for Presentation Service class. For specific attributes utilized during this operation please refer to Appendix B.

3.1.2.2 Real-World Activity – Worklist Lookup

3.1.2.2.1 Associated Real-World Activity

A user may query a DICOM Modality Worklist SCP and select a worklist entry from which to populate the patient demographics within one or more images. When the user clicks the Lookup button from within PacsSCAN, the PacsSCAN AE requests an association with a configured worklist AE. PacsSCAN will then issue a C-Find request that contains any of the search attributes entered by the user. The results are then presented to the user for selection. Once a patient is selected the corresponding worklist attributes are downloaded into the patient entry form.

3.1.2.2.2 Presentation Contexts

Proposed Presentation Context Table				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Modality Worklist Management	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	SCU	None

Figure 4. Presentation Contexts – Worklist Lookup

3.1.2.2.2.1 SOP Specific Conformance for Modality Worklist Management

Standard conformance is provided to the DICOM Modality Worklist Management Service Class. For specific fields that are issued during the Modality Worklist C-Find request please refer to Appendix C.

3.1.2.3 Real-World Activity – Query Lookup

3.1.2.3.1 Associated Real-World Activity

A user may query a DICOM Query/Retrieve SCP and select a patient from which to populate the patient demographics within one or more images. When the user clicks the Lookup button from within PacsSCAN, the PacsSCAN AE requests an association with a configured Q/R SCP AE. PacsSCAN will then issue a C-Find request that contains any of the search attributes entered by

the user. The results are then presented to the user for selection. Once a patient is selected the corresponding attributes are downloaded into the patient entry form.

3.1.2.3.2 Presentation Contexts

Proposed Presentation Context Table				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Study Root Query/Retrieve Information Model – Find	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	SCU	None

Figure 5. Presentation Contexts – Query Lookup

3.1.2.3.2.1 SOP Specific Conformance for Study Root Query/Retrieve

Standard conformance is provided to the DICOM Study Root Q/R Service class. For specific fields that are issued during the C-Find request please refer to 0.

3.1.2.4 Real-World Activity – Print Images

3.1.2.4.1 Associated Real-World Activity

After a user has scanned one or more films into the PacsSCAN system, the user will then click the Send Button. The PacsSCAN AE will request an association with a single configured AE. If the AE represents a print device PacsSCAN will then print all of the images over this association, and will request an association release.

3.1.2.5 Presentation Contexts

Proposed Presentation Context Table				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID			
Basic Grayscale Print Management Meta	1.2.840.10008.5.1.1.9	Implicit VR Little Endian	SCU	None

Figure 6. Presentation Context Table – Print Images

3.1.2.6 SOP Specific Conformance for Basic Film Session SOP Class

The PacsSCAN AE issues the N-CREATE command for the Basic Film Box SOP class with the following attributes supported. Please note the default values for each attribute are in bold type within the description field.

Basic Film Session SOP Class – N-Create		
Attribute Name	Tag	Description
Number of Copies	(2000,0010)	Configurable (1-99)

Figure 7. Supported Attributes for Basic Film Session SOP Class

3.1.2.7 SOP Specific Conformance for Basic Film Box SOP Class

The PacsSCAN AE utilizes the following attributes when issuing a DIMSE_N command for the Basic Film Box SOP class.

Basic Film Session SOP Class – N-Create		
Attribute Name	Tag	Description
Image Display Format	(2010,0010)	STANDARD¥1,1 – 1 UP
Referenced Film Session Sequence	(2010,0500)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Film Size ID	(2010,0050)	Configurable via UI (8Inx10IN, 14Inx17IN, etc)
Magnification Type	(2010,0060)	Configurable via UI
Max Density	(2010,0130)	Configurable via UI (0-400)

Figure 8. Supported Attributes for Basic Film Box SOP Class

3.1.2.8 SOP Specific Conformance for Basic Grayscale Image Box SOP Class

The PacsSCAN AE issues the N-SET command for the Basic Grayscale Image Box SOP class utilizing the following attributes.

Basic Grayscale Image Box SOP Class – N-SET		
Attribute Name	Tag	Description
Image Position	(2020,0010)	
Basic Grayscale Image Sequence	(2020,0110)	
>Samples Per Pixel	(0028,0002)	Always set to 1
>Photometric Interpretation	(0028,0004)	Always set to MONOCHROME2
>Rows	(0028,0010)	
>Columns	(0028,0011)	
>Bits Allocated	(0028,0100)	
>Bits Stored	(0028,0101)	
>High Bit	(0028,0102)	
>Pixel Representation	(0028,0103)	Always set to 0x0000
>Pixel Data	(7FE0,0010)	

3.1.3 Association Acceptance Policy

The PacsSCAN product does not accept incoming associations.

4 Communication Profiles

4.1 Supported Communication Stacks

The PacsSCAN AE provides DICOM 3.0 TCP/IP Network Communication Support as defined in PS 3.8.

4.2 TCP/IP Stack

The PacsSCAN AE implements DICOM 3.0 on top of the Windows TCP/IP stack.

4.2.1 Physical Media Support

The PacsSCAN AE is indifferent to the physical medium over which TCP/IP executes.

5 Extension/Specialization/Privatization

Not applicable.

6 Configuration

The following fields are configurable for the PacsSCAN AE:

- Local AE Title
- Remote Storage AE Title
- Remote Storage IP Address
- Remote Storage Port
- Field that determines if the Lookup operation utilizes DICOM Worklist Management or Query/Retrieve services.
- Lookup Provider AE Title
- Lookup Provider IP Address
- Lookup Provider Port
- Lookup Study Date Range
- Remote Printer AE Title
- Remote Printer IP Address
- Remote Printer Port
- LUT Information for each printer output
- Secondary Capture Device Fields
- Institution Attributes
- Enabling Pixel Spacing attribute

7 Extended Character Sets

Not applicable.

Appendix A. Attribute List for DICOM SC Image Storage SCU

This list contains the DICOM attributes that are used by the PacsSCAN AE when issuing a DICOM Secondary Capture Image Storage request as an SCU.

DICOM Attribute	Comment
(0008,0008) Image Type	ORIGINAL≠SECONDARY
(0008,0016) SOP Class UID	1.2.840.10008.5.1.4.1.1.7 (Secondary Capture)
(0008,0018) SOP Instance UID	
(0008,0020) Study Date	
(0008,0030) Study Time	
(0008,0050) Accession Number	
(0008,0060) Modality	Selected by the user or set with Modality Worklist value
(0008,0064) Conversion Type	WSD
(0008,0070) Manufacturer	PACSGEAR
(0008,0080) Institution Name	
(0008,0090) Referring Physician's Name	
(0008,1010) Station Name	
(0008,1030) Study Description	
(0008,103E) Series Description	
(0008,1040) Institutional Department Name	
(0008,1090) Manufacturer Model Name	
(0010,0010) Patient Name	
(0010,0020) Patient ID	Image may not be sent without this value
(0010,0030) Patient Birthdate	
(0010,0040) Patient Sex	
(0018,1012) Date of Secondary Capture	
(0018,1014) Time of Secondary Capture	
(0018,1016) Secondary Capture Device Manufacturer	PACSGEAR
(0018,1018) Secondary Capture Device Model Name	
(0018,1019) Secondary Capture Device Software Version	
(0018,1020) Software Version	
(0018,1023) Digital Image Format Acquired	
(0020,000D) Study Instance UID	
(0020,000E) Series Instance UID	
(0020,0010) Study ID	
(0020,0011) Series Number	
(0020,0013) Image Number	
(0020,0020) Patient Orientation	
(0028,0002) Samples Per Pixel	1 or 3
(0028,0004) Photometric Interpretation	MONOCHROME2 or RGB
(0028,0006) Planar Configuration	
(0028,0010) Rows	
(0028,0011) Columns	
(0028,0030) Pixel Spacing	Configurable for FILM only
(0028,0100) Bits Allocated	8 or 16

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(0028,0101) Bits Stored	8 or 12
(0028,0102) High Bit	7 or 11
(0028,0103) Pixel Representation	0
(0028,1050) Window Center	
(0028,1051) Window Width	
(7FE0,0010) Pixel Data	

Figure 9. DICOM SC Image Storage SCU Attribute List

Appendix B. Attribute List for DICOM Digital Mammography X-Ray Image Storage – for Presentation

This list contains the DICOM attributes that are used by the PacsSCAN AE when issuing a DICOM Digital Mammography X-Ray Image Storage request as an SCU.

DICOM Attribute	Comment
(0008,0008) Image Type	ORIGINAL*SECONDARY
(0008,0016) SOP Class UID	1.2.840.10008.5.1.4.1.1.7 (Secondary Capture)
(0008,0018) SOP Instance UID	
(0008,0020) Study Date	
(0008,0030) Study Time	
(0008,0050) Accession Number	
(0008,0060) Modality MG	
(0008,0064) Conversion Type	WSD
(0008,0068) Presentation Intent Type	FOR PRESENTATION
(0008,0070) Manufacturer	PACSGEAR
(0008,0080) Institution Name	
(0008,0090) Referring Physician's Name	
(0008,1010) Station Name	
(0008,1030) Study Description	
(0008,103E) Series Description	
(0008,1040) Institutional Department Name	
(0008,1090) Manufacturer Model Name	
(0008,2218) Anatomic Region of Interest Sequence	
> (0008,0100) Code Value	
> (0008,0102) Coding Scheme Designator	
> (0008,0104) Code Meaning	
(0010,0010) Patient Name	
(0010,0020) Patient ID	Image may not be sent without this value
(0010,0030) Patient Birthdate	
(0010,0040) Patient Sex	
(0018,1012) Date of Secondary Capture	
(0018,1014) Time of Secondary Capture	
(0018,1016) Secondary Capture Device Manufacturer	PACSGEAR
(0018,1018) Secondary Capture Device Model Name	
(0018,1019) Secondary Capture Device Software Version	
(0018,1020) Software Version	
(0018,1023) Digital Image Format Acquired	
(0018,1164) Image Pixel Spacing	
(0018,1508) Positioner Type	MAMMOGRAPHIC
(0018,7004) Detector Type	FILM
(0020,000D) Study Instance UID	
(0020,000E) Series Instance UID	

(0020,0010) Study ID	
(0020,0011) Series Number	
(0020,0013) Image Number	
(0020,0020) Patient Orientation	
(0020,0062) Laterality	
(0020,1040) Position Reference Indicator	
(0028,0002) Samples Per Pixel	1
(0028,0004) Photometric Interpretation	MONOCHROME2
(0028,0006) Planar Configuration	
(0028,0010) Rows	
(0028,0011) Columns	
(0028,0030) Pixel Spacing	Configurable for FILM only
(0028,0100) Bits Allocated	8 or 16
(0028,0101) Bits Stored	8 or 12
(0028,0102) High Bit	7 or 11
(0028,0103) Pixel Representation	0
(0028,0301) Burned In Annotation	
(0028,1040) Pixel Intensity Relationship	
(0028,1041) Pixel Intensity Relationship Sign	
(0028,1050) Window Center	
(0028,1051) Window Width	
(0028,1052) Rescale Intercept	
(0028,1053) Rescale Slope	
(0028,1054) Rescale Type	
(0028,2110) Lossy Image Compression	00
(0040,0318) Organ Exposed	BREAST
(0040,0555) Acquisition Context Sequence	
(0054,0220) View Code Sequence	
> (0008,0100) Code Value	
> (0008,0102) Coding Scheme Designator	
> (0008,0104) Code Meaning	
(2050,0020) Presentation LUT Shape	IDENTITY
(7FE0,0010) Pixel Data	

Figure 10. DICOM Digital Mammography X-Ray Image Storage – for Presentation SCU Attribute List

Appendix C. Attributes for DICOM Modality Worklist Management Requests

This table contains the DICOM attributes that are utilized by the PacsSCAN AE when issuing a DICOM Modality Worklist request.

DICOM Attribute	Matching
(0008,0050) Accession Number	Exact match
(0008,0090) Referring Physician	
(0010,0010) Patient Name	User may narrow the search
(0010,0020) Patient ID	Exact match
(0010,0030) Patient Birthdate	
(0010,0040) Patient Sex	
(0020,000D) Study Instance UID	
(0032,1064) Requested Procedure Code Sequence	
>(0008,0100) Code Value	
(0040,0100) Scheduled Procedure Step Sequence	
>(0008,0060) Modality	User may search for a specific modality
>(0040,0002) Scheduled Procedure Step Start Date	Date range query
>(0040,0003) Scheduled Procedure Step Start Time	
>(0040,0007) Scheduled Procedure Description	

Figure 11. DICOM Modality Worklist Attributes

Attributes for DICOM Q/R C-FIND Requests

This table contains the DICOM keys that are utilized by the PacsSCAN AE when issuing a DICOM Q/R C-FIND request. The C-FIND request will always use the Study Root Information model.

DICOM Attribute	Matching
(0008,0020) Study Date	Date range query
(0008,0030) Study Time	
(0008,0050) Accession Number	Exact match
(0008,0052) Query/Retrieve Level	The value is always "STUDY"
(0008,0060) Modality	User may search for a specific modality
(0008,0090) Referring Physician	
(0008,1030) Study Description	
(0010,0010) Patient Name	User may narrow the search
(0010,0020) Patient ID	Exact match
(0010,0030) Patient Birth Date	
(0010,0040) Patient Sex	
(0020,000D) Study Instance UID	

Figure 12. DICOM Q/R C-FIND Attributes