DICOM

Conformance Statement

HD3 Release 2.0

989605349120033 Rev A

PHILIPS

0.1 REVISION HISTORY

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0 Introduction

This document describes the PHILIPS HD3 Ultrasound System's conformance to the ACR-NEMA DICOM (Digital Imaging and Communications in Medicine) standard and satisfies the DICOM requirement for a vendor conformance specification.

The HD3 system is an ultrasound imaging device. The DICOM option of the HD3 system provides a means to send images via DICOM protocol to storage servers and printers.

0.1 DICOM Background

The DICOM information exchange specification provides a definitive structure of commands and information that allow for the intercommunication of medical imaging devices. Developed by the American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA), the DICOM standard strives to promote communication of image information through the use of a standardized set of command classes and information semantics.

The DICOM standard defines classes of information that are common to many modalities of medical imaging. However, to meet the specific needs of information content for such a diverse range of information, the DICOM specification defines structures for a multitude of medical data. To alleviate the need for applications to implement every aspect of the DICOM specification, a list of conformance tables for every modality was created to define the minimum set of information necessary for data exchanges. A requirement of the DICOM specification is to maintain a compliance document that outlines a subset of DICOM services and data classes that are supported by an application. The purpose of this document is to define a subset of DICOM for the exchange of information with the PHILIPS HD3.

This document is written with respect to the ACR-NEMA Digital Imaging and Communications in Medicine (DICOM) version number 3.0, 2003 version. For complete definitions of terms and acronyms in this document, please refer to the Digital Imaging and Communications in Medicine (DICOM) Standard.

1 Networking

1.1 Implementation Model

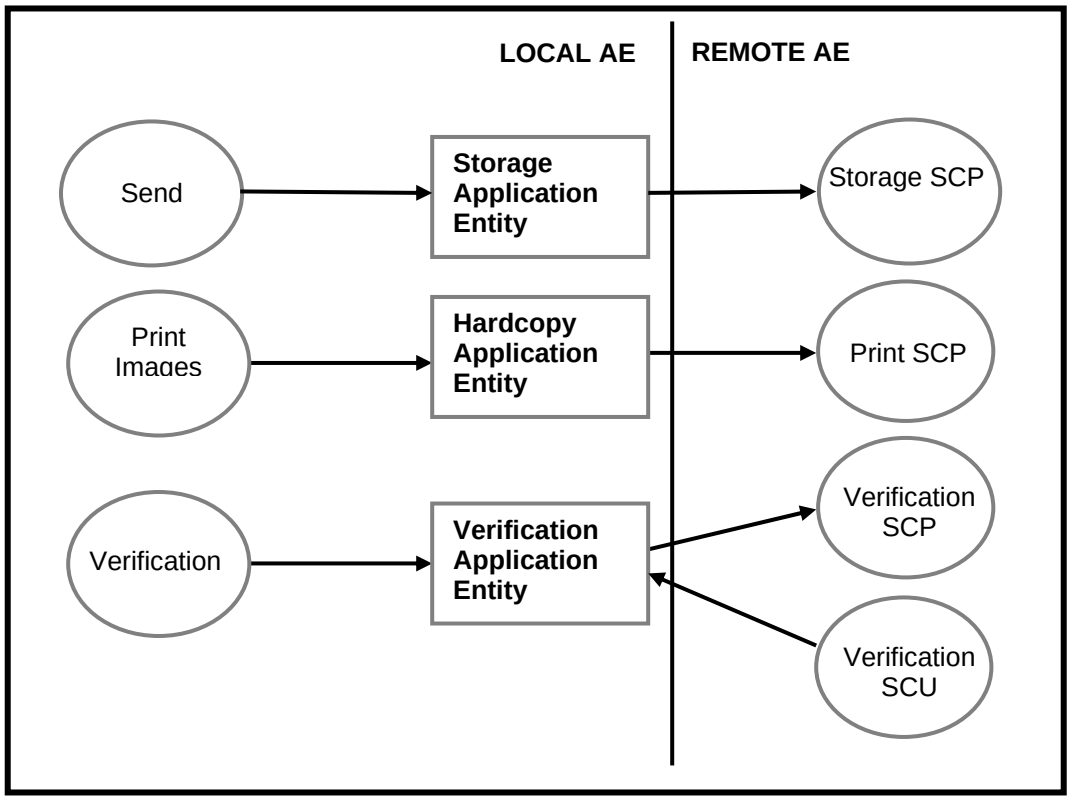
The HD3 DICOM feature incorporates the DICOM 3.0 standard for networked image printing and image store functions. Images are transferred from the HD3 ultrasound system using standard network connections to be processed on a centralized printer or stored on a DICOM compliant file server.

1.1.1 Application Data Flow Diagram

The diagram below represents the HD3's Application Entities (AE) (in the boxes) and depicts the relationship of the Application Entity's use of DICOM to invoke real-world activities (shown on the right side).

There are three local application entities that occur in the HD3 system

Figure 1.1.1-1 Implementation Model



– The Storage Application Entity sends images to a remote AE. Sending images depends on user configuration, "Batch", "Send As You Go" or "Manual". For "Batch" and "Manual" configuration, the system opens an

association, sends all images in the study, and closes the association. If "Send As You Go" is selected, the system handle the association with the Storage SCP Server using the following method;

a. Open Association when first image is acquired, and keep association open until study is closed.

b. If an error occurs while sending an image to the server because there is no longer an open association (server timed-out), attempt to re-establish the association.

c. When study is closed, close any open association.

– The Hardcopy Application Entity prints images on a remote AE (Printer). Printing methods are equal to the Storage Application Entity's.

1.1.2 Functional Definitions of AE's

1.1.2.1 The Storage Application Entity

An association request is sent to the destination AE(s) and upon successful negotiation of a Presentation Context, the image transfer is started. Each export to the Storage SCP is logged the DICOM Log.

1.1.2.2 The Hardcopy Application Entity

An association is established with the printer(s) and the printer's status determined. If the printer is operating normally, the film sheets will be printed. Each export to the Print SCP is logged the DICOM Log.

1.1.3 Sequencing of Real-world Activities

In order for any of the remote processes to be able to provide the Real World Activity SCP services which the HD3 system, an SCU, has requested, the appropriate association must have been opened before sending images to the DICOM equipment. This initiation occurs when first image is acquired in "Send As You Go" mode, the exam is ended in "Batch" Mode or user click "send" command in Review. There are no other sequencing requirements.

1.2 AE Specifications

1.2.1 Storage Application Entity - Specification

The Storage AE provides conformance to the following DICOM SOP Classes as an SCU:

SOP Class Name	SOP Class UID	SCU	SCP
US Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	Yes	No

1.2.1.1 Association Establishment Policies

1.2.1.1.1 General

Application Context Name: "1.2.840.10008.3.1.1.1"

Maximum PDU size offered: 28,672 bytes

Minimum PDU size accepted: 1,024 bytes

1.2.1.1.2 Number of Associations

The maximum number of simultaneous associations for the Storage AE is 4.

Note that the other Application Entities in this device may also be simultaneous active.

1.2.1.1.3 Asynchronous Nature

The Storage AE will not use asynchronous operations window negotiation.

1.2.1.1.4 Implementation Identifying Information

Implementation Class UID: "1.2.840.113543.6.6.5.0 "

Implementation Version Name : CHAMELEON1_0

Notes: "113543" is registered by PHILIPS with ANSI. Version name above will be used initially but is subject to change with versions.

1.2.1.2 Association Initiation by Real-world Activity

1.2.1.2.1 Real-World Activity

1.2.1.2.1.1 Associated Real-World Activity

- For "Send As You Go" mode, the storage AE will open an association to the Storage Server when first image is acquired after entering patient's ID in New Patient window. (Entering patient's Name is optional.) The association remains open during the exam and the images will be sent to the Storage Server automatically. The association will be closed when user invokes End Exam key.
- For "Batch" mode, the storage AE will open associations to the Storage Server when user invokes End Exam Key. All images will be sent to the Storage Server. After all images are transferred, the association will be closed.
- For "Manual" mode, the storage AE will open associations to the Storage Server when the real-world activity occurs corresponding to the user invocation of "Send" command in Review. All images in Selected exams from Review will be sent to the Storage Server. After all images are transferred, the association will be closed.

1.2.1.2.1.2 Proposed Presentation Context to a Storage Server

Table 1.2.1.2.1.2-1 Storage AE Proposed Presentation Contexts to a Storage Server

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
US Image	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

1.2.1.2.1.2.1 SOP Specific Conformance to Verification SOP

The Store AE does not use the Verification SOP Class as an SCU, only for verify.

1.2.1.2.1.2.2 SOP Specific Conformance Statement to US Image Storage SOP Class

Storage C-STORE Response status Handling Behavior

Service Status	Further Meaning	Error code	Behavior
Success	Success	0000	The SCP has successfully stored the SOP Instance. If all SOP instances in a send job have status success then the job is marked as complete in Log.
Refused	Our of Resources	A700-A7FF	The Association is aborted using A-ABOUT and the send job is marked as failed in Log.
Error	Data Set does not match SOP Class	A900-A9FF	Same as “Refused” above
Error	Cannot understand	C000-CFFF	Same as “Refused” above
Warning	Coercion of Data Elements	B000	Same as “Refused” above
Warning	Data Set Does not match SOP Class	B007	Same as “Refused” above
Warning	Elements Discarded	B006	Same as “Refused” above
*		Any other status code	Same as “Refused” above

Storage Communication Failure Behavior

Exception	Behavior
Timeout	The Association is aborted using A-ABOUT and the send job is marked as failed in Log.
Association aborted by the SCP or network layers	The send job is marked as failed in Log.

The US Image Storage SOP uses the US Image IOD Modules as follows:

US Image IOD

IE	Module	Usage	Description
Patient	Patient	M	Used
Study	General Study	M	Used
	Patient Study	U	Not used
Series	General Series	M	Used
Frame of Reference	Frame of Reference	U	Not used
	US Frame of Reference	C	Not used
Equipment	General Equipment	M	Used
Image	General Image	M	Used
	Image Pixel	M	Used
	Contrast/bolus	C	Not used
	US Region Calibration	U	Attribute not always present
	US Image	M	Used
	Overlay Plane	U	Not used
	VOI LUT	U	Not used
	SOP Common	M	Used
Curve	Curve Identification	M	Not used since the Curve IE is mutually exclusive with the Image IE.
	Curve	M	Not used since the Curve IE is mutually exclusive with the Image IE.
	Audio	U	Not used since the Curve IE is mutually exclusive with the Image IE.
	Curve SOP Common	M	Not used since the Curve IE is mutually exclusive with the Image IE.

Additional Module

User can configure this to be included to be interoperable with non-ultrasound viewers.

Module	Usage	Description
Image Plane	U	Used

Each module which is used by the Storage AE has a table below which indicates the elements supported.

Patient Module Elements

Name	Use	Tag	Type	Range	Description
Patient's Name	2	0010, 0010	PN	xx	Patient name with ^ delimiters. Inout Format : LAST <sp> FIRST <sp> MIDDLE <sp> PREFIX <sp> SUFFIX
Patient ID	2	0010, 0020	LO	xx	64 char max
Birth Date	2	0010, 0030	DA	xx	Used
Patient Sex	2	0010, 0040	CS	xx	Used
Referenced Patient Sequence	3	0008, 1120	SQ		Not used
Patient's Birth Time	3	0010, 0032	TM		Not used
Other Patient ID	3	0010, 1000	LO		Not used
Other Patient Names	3	0010, 1001	PN		Not used
Ethnic Group	3	0010, 2160	SH		Not used
Patient Comments	3	0010, 4000	LT		Not used

General Study Module Elements

Name	Use	Tag	Type	Range	Description
Study Instance UID	1	0020, 000D	UI	xx	Used
Study Date	2	0008, 0020	DA	yyyymmdd	Exam date
Study Time	2	0008, 0030	TM	hhmmss	Exam time
Referring Physician Name	2	0008, 0090	PN	xx	Patient name with ^ delimiters. Inout Format : LAST <sp> FIRST <sp> MIDDLE <sp> PREFIX <sp> SUFFIX
Study ID	2	0020, 0010	SH	xx	Zero Length
Accession Number	2	0008, 0050	SH	xx	Used
Study Description	3	0008, 1030	LO	xx	Used
Name of Reading Physician(s)	3	0008, 1060	PN		Not used
Referenced Study Sequence	3	0008, 1110	SQ		Not used

General Series Module Elements

Name	Use	Tag	Type	Range	Description
Modality	1	0008, 0060	CS	US	Always US for ultrasound.
Series Instance UID	1	0020, 000E	UI	xx	Used
Series Number	2	0020, 0011	IS	1	Series number in exam
Laterality	2C	0020, 0060	CS		Not used
Series Date	3	0008, 0021	DA	yyyymmdd	used, Same as Study Date
Series Time	3	0008, 0031	TM	hhmmss	used. Same as Study Time
Performing Physician's Name	3	0008, 1050	PN		Not used
Protocol Name	3	0018, 1030	LO		Not used
Series Description	3	0008, 103E	LO		Not used
Operator's Name	3	0008, 1070	PN	xx	Patient name with ^ delimiters. Inout Format : LAST <sp> FIRST <sp> MIDDLE <sp> PREFIX <sp> SUFFIX
Referenced Study Component Seq.	3	0008, 1111	SQ		Not used
Body Part Examined	3	0018, 0015	CS		Not used
Patient Position	2C	0018, 5100	CS		Not used
Smallest Pixel Value in Series	3	0028, 0108	US		Not used
Largest Pixel Value in Series	3	0028, 0109	US		Not used

General Equipment Module Elements

Name	Use	Tag	Type	Range	Description
Manufacturer	2	0008, 0070	LO	PHILIPS	Used
Institution Name	3	0008, 0080	LO	xx	Used
Institution Address	3	0008, 0081	ST		Not used
Station Name	3	0008, 1010	SH	xx	Used
Institutional Department Name	3	0008, 1040	LO		Not used
Manufacturer's Model Name	3	0008, 1090	LO	HD3	Used
Device Serial Number	3	0018, 1000	LO	xx	used
Software Version	3	0018, 1020	LO	xx	used
Spatial Resolution	3	0018, 1050	DS		Not used
Date of Last Calibration	3	0018, 1200	DA		Not used
Time of Last Calibration	3	0018, 1201	DT		Not used
Pixel Padding Value	3	0028, 0120	US		Not used

General Image Module Elements

Name	Use	Tag	Type	Range	Description
Image Number	2	0020, 0013	IS	1-n	Image number in exam
Patient Orientation	2C	0020, 0020	CS		Zero length
Image Date	2C	0008, 0023	DA	yyyymmdd	used
Image Time	2C	0008, 0033	TM	hhmmss	used
Image Type	2	0008, 0008	CS	The system computes this value as the four component multi-value attribute: "<Pixel Data Characteristics>/ <Patient Examination Characteristics>/ <Modality Specific Characteristics>/ <Implementation Specific Identifiers>" **<Pixel Data Characteristics>** "ORIGINAL" **<Patient Examination Characteristics>** "PRIMARY" **<Modality Specific Characteristics>** Always blank. **<Implementation Specific Identifiers>** 2D : 0001H 2D + M : 0003H 2D + PW : 0009H 2D + Color : 0011H 2D + Color + PW : 0019H 2D + CPA : 0101H 2D + CPA + PW : 0109H	Used
Acquisition Number	3	0020, 0012	IS		Not used
Acquisition Date	3	0008, 0022	DA		Not used
Acquisition Time	3	0008, 0032	TM		Not used
Referenced Image Sequence	3	0008, 1140	SQ		Not used
Derivation Description	3	0008, 2111	ST		Not used
Source Image Sequence	3	0008, 2112	SQ		Not used
Images in Acquisition	3	0020, 1002	IS		Not used
Image Comments	3	0020, 4000	LT		Not used
Lossy Image Compression	3	0028, 2110	CS		Not used
Lossy Image Compression Ratio	3	0028, 2112	DS		Not used

Image Pixel Module Elements

Name	Use	Tag	Type	Range	Description
Samples Per Pixel	1	0028, 0002	US	3	Used
Photometric Interpretation	1	0028, 0004	CS	RGB	Used
Rows	1	0028, 0010	US	480	Pixels
Columns	1	0028, 0011	US	640	Pixels
Bits Allocated	1	0028, 0100	US	8	Used
Bits Stored	1	0028, 0101	US	8	Used
High Bit	1	0028, 0102	US	7	Used
Pixel Representation	1	0028, 0103	US	0	Unsigned int
Pixel Data	1	7FE0, 0010	OB		Used
Planar Configuration	1C	0028, 0006	US	0	Used
Aspect Ratio	1C	0028, 0034	IS		Not used
Smallest Image Pixel Value	3	0028, 0106	US		Not used
Largest Image Pixel Value	3	0028, 0107	US		Not used

US Region Calibration Module Elements

Name	Use	Tag	Type	Range	Description
Sequence of Ultrasound of Regions	1	0018, 6011	SQ		Used
> Region Location Min x0	1	0018, 6018	UL	Left pos of region	Used
> Region Location Min y0	1	0018, 601A	UL	Top pos of region	Used
> Region Location Max x1	1	0018, 601C	UL	Right pos of region	Used
> Region Location Max y1	1	0018, 601E	UL	Bottom pos of region	Used
> Physical Units X Direction	1	0018, 6024	US	2D Image : 0003H = cm Mmode : 0004H = seconds Doppler : 0004H = seconds	Used
> Physical Units Y Direction	1	0018, 6026	US	2D Image : 0003H = cm Mmode : 0003H = cm Doppler : 0005H = hertz($seconds^{-1}$) or	Used

				0007H = cm/sec	
> Physical Delta X	1	0018, 602C	FD	The physical value per pixel increment	Used
> Physical Delta Y	1	0018, 602E	FD	The physical value per pixel increment	Used
> Region Spatial Format	1	0018, 6012	US	0001H	Used
> Region Data Type	1	0018, 6014	US	See DICOM PS 3.3 C.8.5.5.1.2.	Used
> Region Flags	1	0018, 6016	UL	See DICOM PS 3.3 C.8.5.5.1.3	Used

US Image Module Elements

Name	Use	Tag	Type	Range	Description
Photometric Interpretation	1	0028, 0004	CS	RGB	Used
Pixel Representation	1	0028, 0103	US	0	Unsigned int
Frame Increment Pointer	1C	0028, 0009	AT		Not used
Image Type	3	0008, 0008	CS		Not used
Lossy Image Compression	1C	0028, 2110	CS		Not used
Number Stages	2C	0008, 2124	IS		Not used
Number Views in Stage	2C	0008, 212A	IS		Not used
Referenced Overlay Sequence	3	0008, 1130	SQ		Not used
Referenced Curve Sequence	3	0008, 1145	SQ		Not used
Stage Name	3	0008, 2120	SH		Not used
Stage Number	3	0008, 2122	IS		Not used
View Number	3	0008, 2128	IS		Not used
Number of Event Timers	3	0008, 2129	IS		Not used
Event Elapsed Times	3	0008, 2130	DS		Not used
Event Timer Name	3	0008, 2132	LO		Not used
Transducer Position	3	0008, 2240	SQ		Not used
Transducer Orientation	3	0008, 2244	SQ		Not used
Anatomic Structure	3	0008, 2228	SQ		Not used
Trigger Time	3	0018, 1060	DS		Not used
Nominal Interval	3	0018, 1062	IS		Not used
Beat Rejection Flag	3	0018, 1080	CS		Not used
Low R-R Value	3	0018, 1081	IS		Not used
High R-R Value	3	0018, 1082	IS		Not used
Heart Rate	3	0018, 1088	IS		Not used
Output Power	3	0018, 5000	SH		Not used
Transducer Data	3	0018, 5010	DS		Not used
Transducer Type	3	0018, 6031	CS		Not used
Focus Depth	3	0018, 5012	DS		Not used
Preprocessing Function	3	0018, 5020	LO		Not used
Mechanical Index	3	0018, 5022	DS		Not used
Bone Thermal Index	3	0018, 5024	DS		Not used
Cranial Thermal Index	3	0018, 5026	DS		Not used
Soft Tissue Thermal Index	3	0018, 5027	DS		Not used
Soft Tissue-focus Thermal Index	3	0018, 5028	DS		Not used
Soft Tissue-surface Thermal Index	3	0018, 5029	DS		Not used
Depth of Scan Field	3	0018, 5050	IS		Not used
Image Transformation Matrix	3	0018, 5210	DS		Not used
Image Translation Vector	3	0018, 5212	DS		Not used
Ultrasound color data present	3	0028, 0014	US		Not used

SOP Common Module Elements

Name	Use	Tag	Type	Range	Description
SOP Class UID Image Storage.	1	0008, 0016	UI	1.2.840.10008.5.1.4.1.1.6.1	Used
SOP Instance UID	1	0008, 0018	UI	xx	Same as in Command Set
Specific Character Set	1C	0008, 0005	CS	See Section 6	Used
Instance Creation Date	3	0008, 0012	DA		Not used
Instance Creation Time	3	0008, 0013	TM		Not used
Instance Creator ID	3	0008, 0014	UI		Not used

Image Plane Module Elements

Name	Use	Tag	Type	Range	Description
Pixel Spacing	1	0028, 0030	DS	xx/xx	If specified by the user in DICOM Storage Setup AND the image contains only one 2D or the same scaled dual 2D calibration regions and no Doppler or M-Mode calibration regions, then this tag is written to the DICOM File

1.2.2 Hardcopy (Print) Application Entity - Specification

The Printing AE provides conformance to the following DICOM SOP Classes as an SCU:

SOP Class Name	SOP Class UID	Conformance Level
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	Standard
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	Standard
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1	Standard
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2	Standard
Basic Gray Image Box SOP Class	1.2.840.10008.5.1.1.4	Standard
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1	Standard

1.2.2.1 Association Establishment Policies

1.2.2.1.1 General

Application Context Name: "1.2.840.10008.3.1.1.1"

Maximum PDU size offered: 28,672 bytes

Minimum PDU size accepted: 1,024 bytes

1.2.2.1.2 Number of Associations

The maximum number of simultaneous associations for the Printing AE is 4.

1.2.1.1.3 Asynchronous Nature

The Printing AE will not use asynchronous operations window negotiation.

1.2.2.1.4 Implementation Identifying Information

Implementation Class UID: "1.2.840.113543.6.6.5.0 "

Implementation Version Name : CHAMELEON1_0

Notes: "113543" is registered by PHILIPS with ANSI. Version name above will be used initially but is subject to change with versions.

1.2.2.2 Association Initiation by Real-world Activity

1.2.2.2.1 Real-World Activity

1.2.2.2.1.1 Associated Real-World Activity

- For "Send As You Go" mode, the Printing AE will open an association to the Printer when first image is acquired after entering patient's ID in New Patient window. (Entering patient's Name is optional.) The association remains open during the exam and the images will be sent to the Printer automatically. The association will be closed when user invokes End Exam key.
- For "Batch" mode, the Printing AE will open associations to the Printer when user invokes End Exam Key. All images will be sent to the Printer. After all images are transferred, the association will be closed.
- For "Manual" mode, the Printing AE will open associations to the Printer when the real-world activity occurs corresponding to the user invocation of "Print" command in Review. All images in Selected exams from Review will be sent to the Printer. After all images are transferred, the association will be closed.

1.2.2.2.1.2 Proposed Presentation Context to a Gray Print Server

Table 1.2.2.2.1.2-1 Printing AE Proposed Presentation Contexts to a Gray Print Server

Presentation Context Table			
Abstract Syntax	Transfer Syntax	Role	Extended

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 Transfer Syntax	1.2.840.10008.1.2	SCU	None

1.2.2.2.1.2.1 SOP Specific Conformance to Verification SOP Class

The Printing AE does not use the Verification SOP Class as an SCU, only for verify.

1.2.2.2.1.2.2 SOP Specific Conformance to Basic Gray Print Management Meta SOP Class

The Printing AE provides Standard Conformance to the Basic Gray Print Management Meta SOP Class as an SCU. This implies standard conformance for the

Basic Film Session SOP Class,

Basic Film Box SOP Class,

Basic Grayscale Image Box SOP Class,

Printer SOP Class.

Hardcopy Communication Failure Behavior

Exception	Behavior
Timeout	The Association is aborted using A-ABOUT and the print job is marked as failed in Log.
Association aborted by the SCP or network layers	The print job is marked as failed in Log.

Each of these SOP classes is described in the paragraphs to follow.

1.2.2.2.1.2.2.1 SOP Specific Conformance to Basic Film Session SOP Class

DICOM specified usage: M = mandatory, U = User option

Supported DIMSE Services

Name	Usage	Description
N-Create	M	Creates the film session
N-Set	U	Not used

N-Delete	U	Deletes the film session
N-Action	U	Not used

Supported SOP Class Elements

Name	Usage	Range	Description
Number of Copies	U	1 to 99	Number of requested copies of film
Print Priority	U	HIGH, MED, LOW	Used
Medium Type	U	PAPER, CLEAR FILM, BLUE FILM	Range may be further restricted by printer.
Film Destination	U	MAGAZINE, PROCESSOR	Range may be further restricted by printer.
Film Session Label	U	--	Not used
Memory Allocation	U	--	Not used

Film Session SOP Class N-CREATE Response Status Handling Behavior

Service Status	Further Meaning	Error code	Behavior
Success	Success	0000	The SCP has completed the operation successfully.
Warning	Attribute Value Out of Range	0116H	System continues operations.
Warning	Attribute List Error	0107H	Same as above.
*	*	Any other status code	The Association is aborted and the print-job fails.

Film Session SOP Class N-DELETE Response Status Handling Behavior

Service Status	Further Meaning	Error code	Behavior
Success	Success	0000	The SCP has completed the operation successfully.
*	*	Any other status code	The Association is aborted and the print-job fails.

1.2.2.2.1.2.2.2 SOP Specific Conformance to Basic Film Box SOP Class

Supported DIMSE Services

Name	Usage	Description
N-Create	M	Creates the film box.
N-Set	U	Not used
N-Delete	U	Not used
N-Action	M	PRINT - Sent after each filling of a film box and also at the end of the exam if one or more images have been transferred into the film box.

Supported SOP Class Elements

Name	Usage	Range	Description
Image Display Format	M	Standard \1,1 Standard \1,2 Standard \2,2 Standard \2,3 Standard \3.3 Standard \3,4 Standard \3,5 Standard \4,4 Standard \4,5 Standard \4,6	Range may be further restricted by printer.
Referenced Film Session Sequence	M		Used
Referenced SOP Class UID	M	1.2.840.10008.5.1.1.1	Film Session SOP Class UID
Referenced SOP Instance ID	M		Referenced Film Session SOP
Film Orientation	U	Portrait Landscape	Range may be further restricted by printer.
Film Size ID	U	8 in X 10 in 24 cm X 24 cm 10 in X 12 in 24 cm X 30 cm 10 in X 14 in 11 in X 14 in 14 in X 14 in 14 in X 17 in	Range may be further restricted by printer
Magnification Type	U	REPLICATE, BILINEAR, CUBIC, NONE	Used
Max Density	U	Limited by printer	Used
Configuration Information	U		Used
Annotation Display Format Id	U		Not used
Smoothing Type	U		Not used
Border Density	U	Black, White	Used
Empty Image Density	U	Black, White	Used
Min Density	U	Limited by printer	Used
Trim	U		Not used

Film Box SOP Class N-CREATE Response Status Handling Behavior

Service Status	Further Meaning	Error code	Behavior
Success	Success	0000	The SCP has completed the operation successfully.
Warning	Attribute Value Out of Range	0116H	System continues operations.
Warning	Attribute List Error	0107H	Same as above.
Warning	Requested Min Density or Max Density outside of printer's operating range	B605H	The Association is aborted and the print-job fails.
*	*	Any other status code	Same as above.

Film Box SOP Class N-ACTION Response Status Handling Behavior

Service Status	Further Meaning	Error code	Behavior
Success	Success	0000	The SCP has completed the operation successfully. The film has been accepted for printing
Warning	Film Box SOP Instance hierarchy does not contain Image Box SOP Instances (Empty page)	B603H	The Association is aborted and the print-job fails.
*	*	Any other status code	Same as "Warning" above

1.2.2.2.1.2.2.3 SOP Specific Conformance to Basic Grayscale Image Box SOP Class

Supported DIMSE Services

Name	Usage	Description
N-Set	M	An image box instance is created by the SCP for each potential image of the film box. Only the instances that will actually contain images will be updated with the N_SET message.

Supported SOP Class Elements

Name	Usage	Range	Description
Image Position	M	1-n	Used
Pre-formatted Grayscale Image Sequence	M		Used
Samples/pixel	M	1	Used
Photometric Interpretation	M	MONOCHROME2	0 = Black, 255 = White
Rows	M	480	Pixels
Columns	M	640	Pixels
Pixel Aspect Ratio	MC	1/1	Used
Bits Allocated	M	8	8 bits per sample
Bits Stored	M	8	Used
High bit	M	7	Bit 7 is MSB
Pixel Representation	M	0	Unsigned pixel values
Pixel Data	M		Gray pixel data
Polarity	U		Not used
Referenced Overlay Sequence	U		Not used
>SOP Class UID	U		Not used
>SOP Instance UID	U		Not used
Magnification Type	U	Replicate, Bilinear, Cubic, None	Used
Smoothing Type	U		Not used
Requested Image Size	U		Not used

Grayscale Image Box SOP Class N-SET Response Status Handling Behavior

Service Status	Further Meaning	Error code	Behavior
Success	Success	0000	The SCP has completed the operation successfully. The film has been accepted for printing
Warning	Image size if larger than Image Box size. The Image has been demagnified.	B604H	The Association is aborted and the print-job fails.
*	*	Any other status code	Same as “Warning” above

1.2.2.2.1.3 Proposed Presentation Context to a Color Print Server

Table 1.2.2.2.1.3-1 Printing AE Proposed Presentation Contexts to a Color Print Server

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

1.2.2.2.1.3.1 SOP Specific Conformance to Verification SOP Class

The Printing AE does not use the Verification SOP Class as an SCU.

1.2.2.2.1.3.2 SOP Specific Conformance to Basic Color Print Management Meta SOP Class

The Printing AE provides Standard Conformance to the Basic Color Print Management Meta SOP Class as an SCU. This implies standard conformance for the following SOP classes:

Basic Film Session SOP Class

Basic Film Box SOP Class

Basic Color Image Box SOP Class

Printer SOP Class

Hardcopy Communication Failure Behavior

Exception	Behavior
Timeout	The Association is aborted using A-ABOUT and the print job is marked as failed in Log.
Association aborted by the SCP or network layers	The print job is marked as failed in Log.

The SOP classes are described in the sections to follow.

1.2.2.2.1.3.3 SOP Specific Conformance to Basic Color Image Box SOP Class

Supported DIMSE Services

Name	Usage	Description
N-Set	M	An image box instance is created by the SCP for each potential image of the film box. Only the instances which will actually contain images will be updated with the N_SET message.

Supported SOP Class Elements

Name	Usage	Range	Description
Image Position	M	1-n	Used
Pre-formatted Color Image Sequence	M		Used
Samples/pixel	M	3	Used
Photometric Interpretation	M	RGB	Used
Planar Configuration		1	Planar - red plane first, then green, and blue.
Rows	M	480	Pixels
Columns	M	640	Pixels
Pixel Aspect Ratio	MC	1/1	Used
Bits Allocated	M	8	8 bits per sample
Bits Stored	M	8	Used
High bit	M	7	Bit 7 is MSB
Pixel Representation	M	0	Unsigned pixel values
Pixel Data	M		Color pixel planes data
Polarity	U		Not used
Referenced Overlay Sequence	U		Not used
>SOP Class UID	U		Not used
>SOP Instance UID	U		Not used
Magnification Type	U	Replicate, Bilinear, Cubic, None	Used
Smoothing Type	U		Not used
Requested Image Size	U		Not used

Color Image Box SOP Class N-SET Response Status Handling Behavior

Service Status	Further Meaning	Error code	Behavior
Success	Success	0000	The SCP has completed the operation successfully. The film has been accepted for printing
Warning	Image size if larger than Image Box size. The Image has been demagnified.	B604H	The Association is aborted and the print-job fails.
*	*	Any other status code	Same as “Warning” above

1.2.3 Verification Application Entity - Specification

The Verification AE provides conformance to the following DICOM SOP Classes as an SCU and SCP:

SOP Class Name	SOP Class UID	SCU	SCP
Verification SOP Class	1.2.840.10008.1.1	Yes	Yes

1.2.3.1 Association Establishment Policies

1.2.3.1.1 General

Application Context Name: "1.2.840.10008.3.1.1.1"

Maximum PDU size offered: 28,672 bytes

Minimum PDU size accepted: 1,024 bytes

1.2.3.1.2 Number of Associations

- Number of Associations Initiated for AE Verification

The maximum number of simultaneous associations for the Verification AE is 1.

- Number of Associations Accepted for AE Verification

The maximum number of simultaneous associations for the Verification AE is unlimited.

1.2.3.1.3 Asynchronous Nature

The Storage AE will not use asynchronous operations window negotiation.

1.2.3.1.4 Implementation Identifying Information

Implementation Class UID: "1.2.840.113543.6.6.5.0 "

Implementation Version Name : CHAMELEON1_0

Notes: "113543" is registered by PHILIPS with ANSI. Version name above will be used initially but is subject to change with versions.

1.2.3.2 Association Initiation by Real-world Activity

1.2.3.2.1 Real-World Activity

1.2.3.2.1.1 Associated Real-World Activity

- SCU : The user selecting the "Test" button on the dicom send or print dialog of "Review". This tool allows the user to ensure all data was correctly entered and the remote device may be contacted. It uses C-Echo and verifies the remote device supports all configured SOP Classes. Any SOP Classes requested that are not supported will report, "failed". Operations may continue, but objects of the type that are not supported will not be exported.
- SCP: The system listens on the port configured on the DICOM Setup.

1.2.3.2.1.2 Proposed Presentation Context to a Verification Server

Table 1.2.3.2.1.2-1 Verification AE Proposed Presentation Contexts to a Verification Server

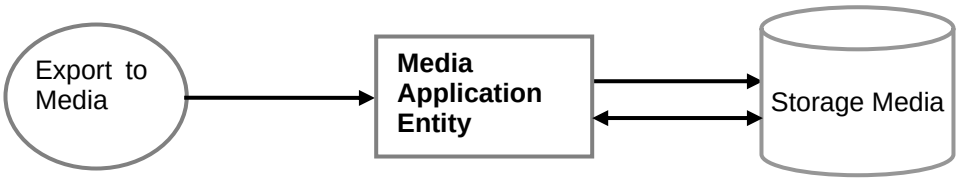
Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification	1.2.840.100008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU/SCP	None

2 Media Storage

2.1 Implementation Model

2.1.1 Application Data Flow Diagram

Figure 2.1.1-1 Implementation Model



The Media Application Entity exports images and Presentation States to a External Storage medium. It's associated with the local real-world activity "Export to Media". "Export to Media" is performed upon user request for selected studies.

2.1.2 Functional Definitions of AE's

Activation of the "Backup" icon on "Exam list" display will pass the currently selected exams to the media Application Entity.

2.1.3 Sequencing of Real-world Activities

At least one exam must exist and be selected before the Media Application Entity can be invoked. The operator can select type of media. If no media is available, the error message will be occurred.

2.1.4 File Meta Information Options

Implementation Class UID: "1.2.840.113543.6.6.5.0 "

Implementation Version Name : CHAMELEON1_0

Notes: "113543" is registered by PHILIPS with ANSI. Version name above will be used initially but is subject to change with versions.

2.2 AE Specifications

2.2.1 Media Application Entity - Specification

The Media Application Entity provides standard conformance to the DICOM Interchange Option of the Media Storage Service Class.

Application Profiles Supported	Real World Activity	Role	SC Option
STD-US-SC-SF-CDR	Export to Media	FSC, FSU	No

2.2.1.1 Real-World Activities

2.2.1.1.1 Activity – Export to Media

The Media Application Entity acts as an FSC sing the interchange option when requested to export SOP Instances from the local database to a Medium

2.2.1.1.2 Activity – Update to Media

The Media Application Entity acts as an FSU using the interchange option when requested to export SOP Instances from the local database to a medium.

The system user selects exams from the system's directory for export to a medium that already contains data. The DICOMDIR is updated allowing access to original and new data.

2.2.1.1.2.1 Media Storage Application Profiles

The Media Application Entity supports the STD-US-SC-SF-CDR Application Profiles.

2.2.1.1.2.2 Options

The Media Application Entity supports the SOP Classes and Transfer Syntaxes listed

IOD	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Explicit VR Little Endian	1.2.840.10008.1.2.1

3 Communication Profiles

3.1 TCP/IP Stack Supported

The TCP/IP protocol is used. The port address is configurable as stated elsewhere in the DCS.

3.1.1 Physical Media Supported

Line speed : 10/100 Mbps
Cable type : UTP, STP
Duplex mode : Full, Half
Connector : RJ-45

4 Extensions/Specializations/Privatizations

4.1 Standard Extended/Specialized/Private SOPs

None

4.2 Private Transfer Syntaxes

None.

5 Configuration

This device obtains configuration information at the time of installation to provide the following.

mapping from Application Entity Title to Presentation Address
device configuration information

5.1 AE Title/Presentation Address Mapping

The translation from AE Title to Presentation Address is to be performed using a look up table loaded at installation or some other time.

5.2 Configurable Parameters

A lookup table contains the following configuration parameters.

Application Entity Title
IP Address
Port number

6 Support of Extended Character Sets

All HD3 applications support the

ISO_IR 6
ISO_IR 100

END OF DOCUMENT