

REVISION STATUS	REV	REVISION STATUS	
	A	<p>Initial Release</p> <p>The HDI 3500's initial DICOM implementation is a subset of the HDI 5000, Level 10.2 with the following main differences:</p> <p>No DICOM Region Scaling support</p> <p>No Modality Worklist support</p>	SEE PIMS FOR EFFECTIVITY, REVISION & RELEASE STATUS

DOCUMENT TITLE

**HDI 3500 DICOM Conformance Statement**


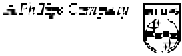
DOCUMENT PURPOSE:

This document is to specify the DICOM conformance of the ATL HDI 3500, software version 150.23, Level 8.5.

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## **0. Introduction**

This document describes the ATL HDI® 3500 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 HDI 3500 system is an ultrasound imaging device. The NetLink option of the HDI 3500 system provides a means to send images to DICOM 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 inter-communication 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 ATL HDI 3500 via its NetLink feature.

This document is written with respect to the ACR-NEMA Digital Imaging and Communications in Medicine (DICOM) version number 3.0.

# 1. Implementation Model

The HDI 3500 NetLink feature incorporates the DICOM 3.0 standard for networked image printing and image store functions. Images are transferred from the HDI 3500 ultrasound system using standard network connections to be processed on remote DICOM-compatible Print and Storage devices.

## 1.1 Application Data Flow Diagram

The diagram in Figure 1.1-1 represents the relationship between Ultrasound system's real-world activities (in circles) that invoke of the NetLink device's Application Entity's local use of DICOM on the left side, and depicts the remote DICOM destination AE's on the right side. All Application Entities are in boxes.

### Printing

When the user selects a New Patient via the Patient Data Entry facility, the Printing AE will initiate separate associations to the print servers to verify their on-line status. When selecting a device, the association created to check on-line status is closed when completed. When Patient Data entry is completed, another association is made, which is also closed. When the exam is started and the first image is sent, these associations remain open during the remainder of the examination. When Print is commanded (and depending upon the system configuration), the Printing AE will send an image to the appropriate printer. The N\_Get Printer SOP is used automatically every two minutes during the exam to ensure that the print servers remain on-line during this time. When the End Exam command is invoked, any partially filled sheet of film is forced to be printed and then the associations are closed.

### Storing

Also, when the user selects a New Patient via the Patient Data Entry facility, the Storing AE will initiate a separate association to each selected storage server to verify its on-line status. This initial association is closed. The end of Patient Data Entry will repeat the process, also closing the associations. When the first image is sent, another association is made, verified, then the associations remain open during the exam. When the user selects Store Image, the Storing AE sends the image to the server. When the End Exam command is invoked the association is closed.

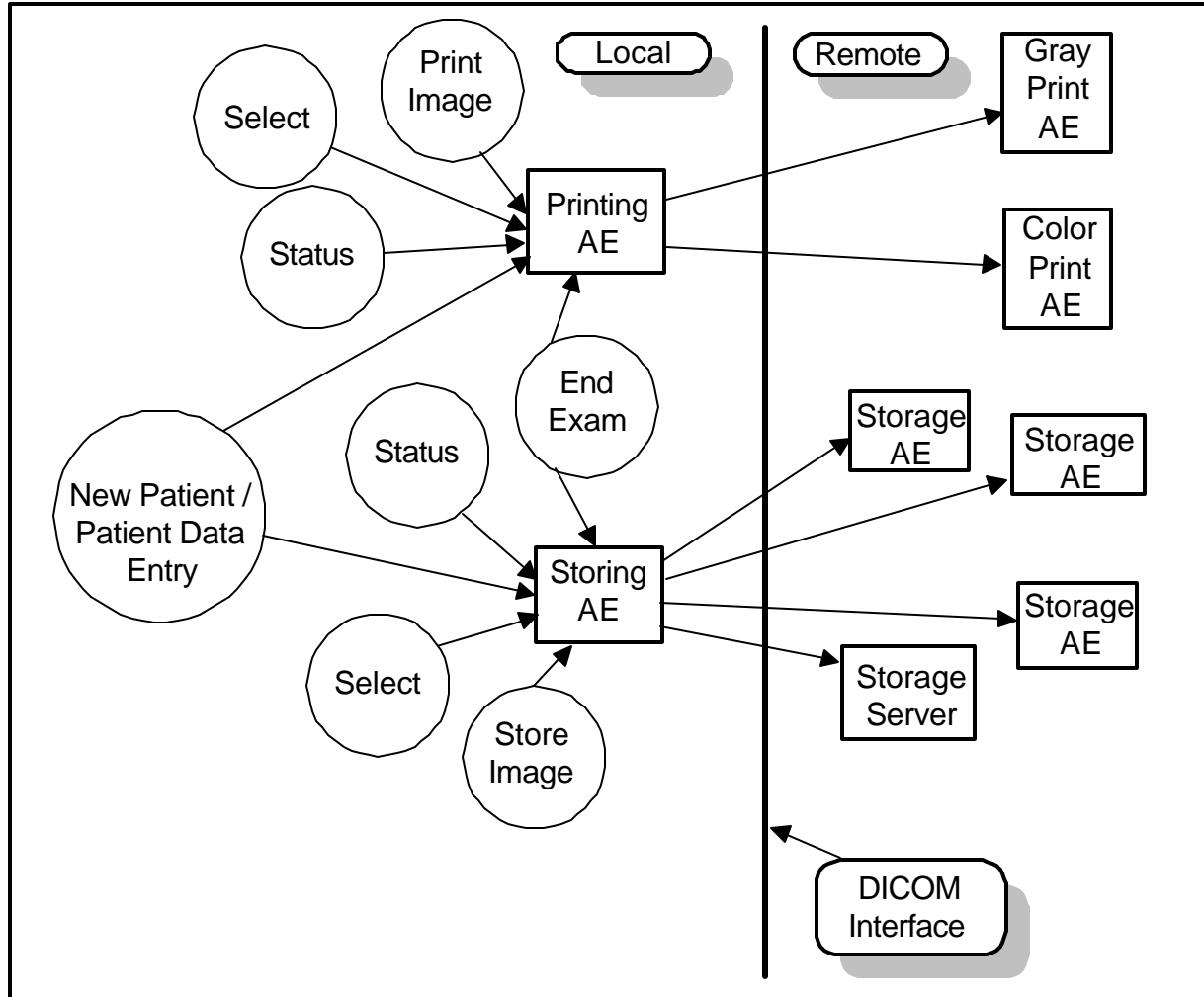
A C-ECHO (for Storage devices), or N\_GET Status (for Print devices) are issued upon completion of power up when network devices are already selected in the system. These associations are created and closed when the response is complete.

The Association Negotiation sequence is:

TABLE 1.1-1 ASSOCIATION NEGOTIATION - ASSOCIATION STATUS

User Action	DICOM Activity - Store	DICOM Activity - Print
Select Device	Association Negotiation, C-ECHO, then Association Release Request	Association Negotiation + N-Create Film Session and N_Create Film Box, N_GET Status then two N_Deletes , Association Release Request
Complete Patient Data Entry	Association Negotiation, C-ECHO, then Association Release Request	Association Negotiation + N-Create Film Session and N_Create Film Box, N_GET Status then two N_Deletes , Association Release Request
First data sent from system	Association Negotiation, C-ECHO then C-Store until End Exam when Association Release Request is sent.	Association Negotiation + N-Create Film Session and N_Create Film Box, N_GET Status then N_Sets for each image and N_Action for each page and End of Exam, then Association Release Request

FIGURE 1.1-1 IMPLEMENTATION MODEL



The Print and Store AE's share the same AE title.

Note: The Status command initiates a Verify to the selected Storage SCPs. Printers are sent the N\_Get Status command to ensure network communications prior to use.

## 1.2 Functional Definitions of AE's

### Printing AE

This AE handles all aspects of the Print Management SCU. The remote SCP must support the Verification SOP Class.

### Storing AE

This AE handles sending ultrasound images to a storage server using the DICOM Store SCU Services. The remote SCP must support the Verification SOP Class.

## 1.3 Sequencing of Real-World Activities

For printing and storing using the Print Gray Image, Print Color Image, and Store Image commands, an association must have been previously opened using the New Patient command. The destination device(s) must have successfully responded to the N\_Get Status (printers) or Verification SOP class (storage) prior to use.

Associations may also be initiated in certain circumstances upon system power up or connection to the network.

## 2. AE Specifications

### 2.1 Printing AE - 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
Printer SOP Class	1.2.840.10008.5.1.1.16	Standard
Verification SOP Class	1.2.840.10008.1.1	Standard

#### 2.1.1 Association Establishment Policies

The Printing AE will initiate an association when the user invokes the New Patient / Patient Data Entry command and when image data transfer begins. The Gray and Color SOP Print Management Service Class connections will be done on separate associations. The N\_Get Printer SOP will be used every two minutes to verify that an association is still active even though no printing is taking place.

##### 2.1.1.1 General

Maximum PDU size offered: 32,768 bytes

Minimum PDU size accepted: 1,024 bytes

##### 2.1.1.2 Number of Associations

Number of simultaneous associations for the Printing AE:

1 for Gray Print Management

1 for Color Print Management

Note that the other Application Entities in this device may be simultaneously active and thus other associations may be open simultaneously with these.

##### 2.1.1.3 Asynchronous Nature

The Printing AE will not use asynchronous operations.

##### 2.1.1.4 Implementation Identifying Information

Implementation Class UID: "1.2.840.113663.1"

Implementation Version name: "Tiller\_v101"

Notes: "113663" is registered by ATL with ANSI. Version name above will be used initially but is subject to change with versions.

## 2.1.2 Association Initiation by: Real-World Activity

The Printing AE will open associations to the Gray Print Server and to the Color Print Server when the real-world activity occurs corresponding to the user invocation of Select Printer, New Patient or when image data transfer begins.

### 2.1.2.1 Association Initiation by: New Patient

The user invocation of New Patient will cause separate associations to be initiated to a Gray Print Server and a Color Print Server. These two associations may actually be handled by one device but are managed separately by the Printing AE.

### 2.1.2.2 Association Initiation by: Select Printer

The user invocation of Select Printer will initiate an association to the Print Server followed by an N-GET for printer status.

## 2.1.3 Proposed Presentation Context to a Gray Print Server

TABLE 2.1.3 –1 PRINTING AE PROPOSED PRESENTATION CONTEXTS TO A GRAY PRINT SERVER

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Gray 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
Verification SOP Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

### 2.1.3.1 SOP Specific Conformance to Verification SOP Class

The Printing AE requires the Verification SOP Class as an SCU. The remote SCP must support the Verification SOP Class.

### 2.1.3.2 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.

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



### 2.1.3.3 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 many	Number of requested copies of film
Print Priority	U	MED	Used
Medium Type	U	Paper Clear Film Blue Film	Printer may further restrict range.
Film Destination	U	Magazine Processor	Printer may further restrict range.
Film Session Label	U	--	Not used
Memory Allocation	U	--	Not used

### 2.1.3.4 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	Deletes the film box. Used after each film is printed.
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 \ 1,1 Standard \ 1,2 Standard \ 2,1 Standard \ 2,3 Standard \ 3,2 Standard \ 3,3 Standard \ 3,3 Standard \ 3,4 Standard \ 4,3 Standard \ 3,5 Standard \ 5,3 Standard \ 4,5 Standard \ 5,4 Standard \ 5,6 Standard \ 6,5	Printer may further restrict range.
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 UID	M		Referenced Film Session SOP
Film Orientation	U	Portrait Landscape	Printer may further restrict range.
Film Size ID	U	8 in X 10 in 14 in X 14 in 10 in X 12 in 14 in X 17 in 10 in X 14 in 24 cm X 24 cm 11 in X 14 in 24 cm X 30 cm 11 in X 17 in 35 cm X 43 cm	Printer may further restrict range.

		12 in X 18 in	
Magnification Type	U	Configurable	None, Bilinear, Cubic, Bicubic, Mitchell, Lanczos, Replicate
Max Density	U	Limited by printer	Used
Configuration Information	U	Limited by printer	Used
Annotation Display Format Id	U		Not used
Smoothing Type	U		Not used
Border Density	U	Dmin to Dmax	Used
Empty Image Density	U	Dmin to Dmax	Used
Min Density	U	Limited by printer	Used
Trim	U		Not used

### 2.1.3.5 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 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 Grayscale Image Sequence	M		Used
Samples/pixel	M	1	Used
Photometric Interpretation	M	MONOCHROME2	0 = black, 255 = white
Rows	M	476 (NTSC), 576 (PAL)	pixels
Columns	M	640 (NTSC), 768 (PAL)	pixels
Pixel Aspect Ratio	M	68/68 (NTSC);82/82 (PAL)	
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	Configurable	Used
Smoothing Type	U		Not used
Requested Image Size	U		Not used

### 2.1.3.6 SOP Specific Conformance to Printer SOP Class

#### Supported DIMSE Services

Name	Usage	Description
N-Event-Report	M	Handled but always ignored. Asynchronous input from the printer to this AE used to report changes in printer status. It may be received any time after association establishment and before association release or abort.
N-Get	U	May be issued by this device at any time to get printer status. The Attribute Identifier List will always be empty indicating that all attributes are to be returned.

#### Supported SOP Class Elements

Note: This device does not set these attributes. The attribute description here indicates which attributes this device uses when they are returned by the printer.

Name	Usage	Range	Description
Printer Status	U	NORMAL WARNING FAILURE	Warning and Failure are reported to user.
Print Status Info	U		Reported to user.
Printer Name	U		Ignored
Manufacturer	U		Ignored
Model Name	U		Not used
Serial Number	U		Not used
Software Version	U		Not used
Calibration Date	U		Not used
Calibration Time	U		Not used

## 2.1.4 Proposed Presentation Context to a Color Print Server

TABLE 2.1.2.1.2-1 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
Verification SOP Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

### 2.1.4.1 SOP Specific Conformance to Verification SOP Class

The Printing AE requires the Verification SOP Class as an SCU. The remote SCP must support the Verification SOP Class.

### 2.1.4.2 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

Only the SOP classes specific to Color are described in the sections that follow. Otherwise, the Color Print Management Meta SOP Class uses the same general Printer and Film SOP classes as Grayscale.

### 2.1.4.3 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	M	1	Planar—red plane first, then green, and blue.
Rows	M	476 (NTSC),576 (PAL)	Pixels
Columns	M	640 (NTSC), 768 (PAL)	Pixels
Pixel Aspect Ratio	M	68/68 (NTSC), 82/82 (PAL)	
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	Configurable	Used
Smoothing Type	U		Not used
Requested Image Size	U		Not used

## 2.2 Storing AE - Specification

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

SOP Class Name	SOP Class UID	Conformance Level
Verification SOP Class	1.2.840.10008.1.1	Standard
Ultrasound Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.6.1	Standard
Ultrasound Image Storage SOP Class (retired)	1.2.840.10008.5.1.4.1.1.6	Standard
Ultrasound MultiFrame Image SOP Class	1.2.840.10008.5.1.4.1.1.3.1	Standard
Ultrasound MultiFrame Image SOP Class (retired)	1.2.840.10008.5.1.4.1.1.3	Standard

Note: the choice of retired or retired or new SOP Class is configurable.

### 2.2.1 Association Establishment Policies

When the system is configured to “store during exam” the Storing AE will initiate an association when the user invokes the New Patient command. When configured to “store at end of exam,” the system will open the association at the end of the exam, transfer the entire study, then close the association. If an error occurs and the connection is broken, the system will periodically reattempt association to transfer the remaining data, even after the occurrence of a power cycle.

#### 2.2.1.1 General

Maximum PDU size offered: 32,768 bytes

Minimum PDU size accepted: 1,024 bytes

#### 2.2.1.2 Number of Associations

Number of simultaneous associations: 4

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

#### 2.2.1.3 Asynchronous Nature

The Storing AE will not use asynchronous operations.

#### 2.2.1.4 Implementation Identifying Information

Implementation Class UID: “1.2.840.113663.1”

Implementation Version name: “Tiller\_v101”

Notes: “113663” is registered by ATL with ANSI. Version name above will be used initially but is subject to change with versions.

### 2.2.2 Association Initiation by: Real-World Activity

The Storing AE will open an association to the Storage Server when the real-world activity occurs corresponding to the user invocation of Select Storage Server, New Patient and when image data transfer starts.

#### 2.2.2.1 Association Initiation by: New Patient

The user invocation of New Patient will cause an association to be initiated to a Storage Server.

### 2.2.2.2 Association Initiation by: Select Storage Server

The user invocation of Storage Server will cause an association to be initiated to a Storage Server.

### 2.2.3 Proposed Presentation Context to a Storage Server

The presentation context is configurable from the SOPs in the following table.

TABLE 2.2.3-1 STORING AE PROPOSED PRESENTATION CONTEXTS TO A STORAGE SERVER

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Ultrasound Image Storage (retired)	1.2.840.10008.5.1.4.1.1.6	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Ultrasound Multiframe Image	1.2.840.10008.5.1.4.1.1.3.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Ultrasound Multiframe Image Storage (retired)	1.2.840.10008.5.1.4.1.1.3	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

#### 2.2.3.1 SOP Specific Conformance to Verification SOP Class

The Storing AE provides standard conformance to the Verification SOP Class as an SCU. The remote SCP must support the Verification SOP Class on the same Association as the Storage SOP Class.

#### 2.2.3.2 SOP Specific Conformance to Ultrasound Image Storage SOP Class

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

Ultrasound Image Storage Modules Used

Module	Usage	Description
Patient	M	Used
General Study	M	Used
Patient Study	U	Used
General Series	M	Used
Frame of Reference	U	Not used
US Frame of Reference	C	Not used
General Equipment	M	Used
General Image	M	Used
Image Pixel	M	Used
Contrast/bolus	C	Not used
Cine	C	Used (in Multiframe SOP)
Multi-frame	C	Used (in Multiframe SOP)
US Region Calibration	U	Not used
US Image	M	Used
Overlay Plane	U	Not used.

VOILUT	U	Used, if configured
SOP Common	M	Used
Curve Identification	M	Not used.
Curve	M	Not used.
Audio	U	Not used.
Curve SOP Common	M	Not used.

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

#### Patient Module Elements

Name	Tag	Type	VR	Range	Description
Patient's Name	0010, 0010	2	PN	xx	Patient name with ^ delimiters, supporting LAST^FIRST^M only. As of 10.1.2, Last Name field may contain up to 64 characters. If Last is less, then first will be filled. If space remains, Middle is added. Tag will not exceed 64 characters total, including ^ delimiters.
Patient ID	0010, 0020	2	LO	xx	18 char max
Birth Date	0010, 0030	2	DA	xx	Used
Patient Sex	0010, 0040	2	CS	xx	M, F or O
Referenced Patient Sequence		3			Not used
Patient's Birth Time		3			Not used
Other Patient ID		3			Not used
Other Patient Names		3			Not used
Ethnic Group		3			Not used
Patient Comments		3			Not used

#### General Study Module Elements

Name	Tag	Type	VR	Range	Description
Study Instance UID	0020, 000D	1	UI	xx	Generated by system.
Study Date	0008, 0020	2	DA	yyyymmdd	Exam date
Study Time	0008, 0030	2	TM	hhmmss	Exam time
Referring Physician Name	0008, 0090	2	PN		Zero length
Study ID	0020, 0010	2	SH	xx	System Generated exam number
Accession Number	0008, 0050	2	SH	xx	Used, may be blank if none entered.
Study Description	0008, 1030	3	LO	xx	Zero length
Name of Reading Physician(s)		3			Not used
Referenced Study Sequence		3			Not used

#### General Series Module Elements

Name	Tag	Type	VR	Range	Description
Modality	0008, 0060	1	CS	US	Always US for ultrasound
Series Instance UID	0020, 000E	1	UI	xx	Used, one series per exam
Series Number	0020, 0011	2	IS	xx	series number in exam
Laterality	0020, 0060	2C			Not used
Series Date	0008, 0021	3	DA	yyyymmdd	Zero length if unknown
Series Time	0008, 0031	3	TM	hhmmss	Zero length if unknown
Performing Physician's Name	0008, 1050	3			Not used

Protocol Name	0018, 1030	3	LO	xx	Zero length
Series Description	0008, 103E	3	LO	xx	Used
Operator's Name	0008, 1070	3			Not used
Referenced Study Component Sequence	0008, 1111	3			Not used
Body Part Examined	0018, 0015	3			Not used
Patient Position	0018, 5100	2C			Not used
Smallest Pixel Value in Series	0028, 0108	3			Not used
Largest Pixel Value in Series	0028, 0109	3			Not used

#### General Equipment Module Elements

Name	Tag	Type	VR	Range	Description
Manufacturer	0008, 0070	2	LO	ATL	Used
Institution Name	0008, 0080	3	LO		Used
Institution Address		3			Not used
Station Name		3			Not used
Institutional Department Name		3			Not used
Manufacturer's Model Name	0008, 1090	3	LO	HDI 3500	Used
Device Serial Number		3			Not used
Software Version	0018, 1020	3	LO	xx	Used
Spatial Resolution		3			Not used
Date of Last Calibration		3			Not used
Time of Last Calibration		3			Not used
Pixel Padding Value		3			Not used

#### General Image Module Elements

Name	Tag	Type	VR	Range	Description
Image Number	0020, 0013	2	IS	1-200	Image number in exam
Patient Orientation	0020, 0020	2C	CS		Zero length
Image Date	0008, 0023	2C	DA	yyyymmdd	Used
Image Time	0008, 0033	2C	TM	hhmmss	Used
Image Type	0008, 0008	2	CS		Used, see Image Attribute Descriptions below
Acquisition Number		3			Not used
Acquisition Date		3			Not used
Acquisition Time		3			Not used
Referenced Image Sequence		3			Not used
Derivation Description		3			Not used
Source Image Sequence		3			Not used
Images in Acquisition		3			Not used
Image Comments	0020,4000	3	LT	xx	User annotation text or modality description. Max 20 char

#### Image Pixel Module Elements

Name	Tag	Type	VR	Range	Description
Samples/ Pixel	0028, 0002	1	US	1, 3	For Gray For Color
Photometric	0028, 0004	1	CS	MONOCHROME2,	For Gray



Interpretation				RGB	For Color
Rows	0028, 0010	1	US	476 (NTSC), 576 (PAL)	Used
Columns	0028, 0011	1	US	640 (NTSC), 768 (PAL)	Used
Bits Allocated	0028, 0100	1	US	8	Used
Bits Stored	0028, 0101	1	US	8	Used
High Bit	0028, 0102	1	US	7	Used
Pixel Representation	0028, 0103	1	US	0	Unsigned ints
Pixel Data	7FE0, 0010	1	OB		Used
Planar Configuration	0028, 0006	1C	US	0, 1	0=Pixel Interleave, 1=Planar
Aspect Ratio	0028, 0034	1C	IS	68/68 (NTSC); 82/82 (PAL)	Pixel aspect ratio
Smallest Image Pixel Value	0028, 0106	3			Not used
Largest Image Pixel Value	0028, 0107	3			Not used
Red Palette Color Lookup Table Descriptor	0028, 1101	1C	US		Not used
Green Palette Color Lookup Table Descriptor	0028, 1102	1C	US		Not used
Blue Palette Color Lookup Table Descriptor	0028, 1103	1C	US		Not used
Red Palette Color Lookup Table Data	0028, 1201	1C	US		Not used
Green Palette Color Lookup Table Data	0028, 1202	1C	US		Not used
Blue Palette Color Lookup Table Data	0028, 1203	1C	US		Not used

### US Image Module Elements

Name	Tag	Type	VR	Range	Description
Photometric Interpretation	0028, 0004	1	CS	MONOCHROME2 RGB	for Gray for Color
Pixel Representation	0028, 0103	1	US	0	Unsigned ints
Frame Increment Pointer	0028, 0009	1C	AT		Sequencing by frame time vector
Lossy Image Compression	0028, 2110	1C	CS		Used
Image Type	0008, 0008	2	CS		Used, see Image Attribute Descriptions below
Number Stages	0008, 2124	2C	IS	0	Present, always zero
Number Views in Stage	0008, 212A	2C	IS	0	Present, always zero
Referenced Overlay Sequence		3			Not used
Referenced Curve Sequence		3			Not used
Stage Name	0008, 2120	3	SH		Zero length
Stage Number	0008, 2122	3	IS	0	Present, always zero
View Number	0008, 2128	3	IS	0	Present, always zero
Number of Event Timers	0008, 2129	3	IS	0	Present, always zero
Event Elapsed Times	0008, 2130	3	DS		Zero length
Event Timer Name		3			Not used
Transducer Position		3			Not used
Transducer Orientation		3			Not used
Anatomic Structure		3			Not used
Trigger Time	0018, 1060	3	DS	0000	Present, always zero
Nominal Interval		3			Not used
Beat Rejection Flag		3			Not used
Low R-R Value		3			Not used

High R-R Value		3				Not used
Heart Rate	0018, 1088	3	IS	0		Present, always zero
Output Power		3				Not used
Transducer Data		3				Not used
Transducer Type		3				Not used
Focus Depth		3				Not used
Preprocessing Function		3				Not used
Mechanical Index		3				Not used
Bone Thermal Index		3				Not used
Cranial Thermal Index		3				Not used
Soft Tissue Thermal Index		3				Not used
Soft Tissue-focus Thermal Index		3				Not used
Soft Tissue-surface Thermal Index		3				Not used
Depth of Scan Field		3				Not used
Image Transformation Matrix		3				Not used
Image Translation Vector		3				Not used
Ultrasound color data present	0028, 0014	3	US	0 1		for Gray for Color

### Image Attribute Descriptions

Image Type: This multi-value attribute is ORIGINAL/PRIMARY/(blank)/*nnnn*. The third field is always blank. This denotes *original* source data based on *primary* examination. *nnnn* is a bit map designating the image modes:

0001 = 2D Imaging	0002 = M-Mode	0004 = CW Doppler
0008 = PW Doppler	0010 = Color Doppler	0020 = Color M-Mode

### Cine Module Elements

Name	Tag	Type	VR	Range	Description
Frame Time Vector	0018, 1065	1	IS	xx	An array of time intervals (in msec) between frames

### Multi-Frame Module Elements

Name	Tag	Type	VR	Range	Description
Number of Frames	0028, 0008	1C	IS	2 - n	Number of frames in the loop
Frame Increment Pointer	0028, 0009	1C	AT	0018, 1065	Tag that specifies the frame increment

### VOI LUT Element

Name	Tag	Type	VR	Range	Description
Window Center	0028, 1050	3	DS	128	Description of Center point of range
Window Width	0028, 1051	1C	DS	256	Range assigned to 8 bit images (Required if Window Center is sent.)

### SOP Common Module Elements

Name	Tag	Type	VR	Range	Description
SOP Class UID Image Storage.	0008, 0016	1	UI	Same as in Command Set	Same as in Command Set
SOP Instance UID	0008, 0018	1	UI	Same as in Command Set	Same as in Command Set
Specific Character Set		1C			Not used

Instance Creation Date		3		Not used
Instance Creation Time		3		Not used
Instance Creator ID		3		Not used

## 2.2.5 Storing AE Behavior to SCP Status

### Storing AE Behavior to Status Returned from SCP

Status Value	Meaning	Description	Storing AE Behavior
0000	Success		Upon successfully storing data to an archive server, the Storing AE will continue operation without user notification.
A7xx	Refused	Out of resources	The association is terminated. The user is notified of the failure.
A9xx	Error	Data set does not match SOP class	Same as A7xx.
Cxxx	Error	Cannot understand	Same as A7xx.
B000	Warning	Coercion of data elements	Ignored.
B007	Warning	Data set does not match SOP class	Same as A7xx.
B006	Warning	Elements discarded	Ignored.

## 3. Communication Profiles

### 3.1 TCP/IP Stack Supported

The TCP/IP protocol is used.

### 3.2 Physical Media Supported

Standard IEEE 802 (Ethernet) 10BaseT (twisted pair), 10Base2 (thin coax) and 10BaseFL (Fiber Optic Link) are supported using appropriate AUI port transceiver adapter unit.

Destination Ethernet address shall be acquired using the Address Resolution Protocol (ARP).

Internet Protocol (IP) address shall be acquired manually and pre-loaded into the device.

## 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.

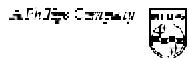
- Application Entity Title
- IP Address
- Remote SCP Port number

Selectable by System Option or Device File setting:

- US Regions Scaling Sequence
- Use of VOI LUT (Window Level = 256, and Window Center = 128)
- RGB as Planar or Pixel Interleave (Color-by-plane or Color-by-pixel)
- Network Read / Write Timeouts

## 6. Support of Extended Character Sets

Extended character sets are not supported.



We are Ultrasound

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