FUJIFILM

SonoSite PDAS

Patient Data Archival Software

# DICOM Conformance Statement

Product Software v1.0

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## Conformance Statement Overview

The PDAS application implements the necessary DICOM services to receive, store, query, and retrieve images and reports transmitted from ultrasound systems .

Table 1-1 provides an overview of the network services supported by PDAS.

**Table 1-1 NETWORKING SERVICES**

| NETWORKING SOP CLASSES | USER OF SERVICE (SCU) | PROVIDER OF SERVICE (SCP) |
|---|---|---|
| **TRANSFER** | | |
| Ultrasound Image Storage | No | Yes |
| Ultrasound Multi-Frame Image Storage | No | Yes |
| Encapsulated CDA Storage | No | Yes |
| Basic Text SR Storage | No | Yes |
| **QUERY/RETRIEVE** | | |
| Study Root Information Model FIND | No | Yes |
| Study Root Information Model MOVE | No | Yes |
| Patient Root Information Model FIND | No | Yes |
| Patient Root Information Model MOVE | No | Yes |
| **GENERAL** | | |
| Verification | Yes | Yes |

Table 1.1-2 provides an overview of the media storage services supported by PDAS.

**Table 1.1-2 MEDIA STORAGE SERVICES**

| SOP CLASSES | ROLE |
|---|---|
| Media Storage Directory Storage | FSC |
| Ultrasound Image Storage | FSC |
| Ultrasound Multi-Frame Image Storage | FSC |
| Encapsulated CDA Storage | FSC |
| Basic Text SR Stroage | FSC |

# 1 INTRODUCTION

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

PDAS is an ultrasound image storage system. The DICOM options of PDAS provide a means to receive, store, query, and retrieve ultrasound images.

This document is written with respect to ACR-NEMA DICOM version number 3.0 - 2007.

## 1.1 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 a device. The purpose of this document is to define a subset of DICOM for the exchange of information with the SonoSite PDAS application via its DICOM features.

## 1.2 DEFINITIONS

| | |
|---|---|
| AE | Application Entity |
| ANSI | American National Standards Institute |
| DICOM | Digital Imaging and Communications in Medicine |
| FSC | File Set Creator |
| FSR | File Set Reader |
| IOD | Information Object Definition |
| PDU | Protocol Data Unit |
| PPS | Performed Procedure Step |
| SCU | Service Class User (Client) |
| SCP | Service Class Provider (Server) |
| SOP | Service – Object Pair |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| UID | Unique Identifier |
| US | Ultrasound |
| VR | Value Representation |

## 1.3 REFERENCE DOCUMENTS

ACR-NEMA DICOM Standard Version 3.0 – 2007

# 2 IMPLEMENTATION MODEL

The PDAS DICOM features incorporate the DICOM 3.0 standard for networked image storage functions. Performed Procedures[1] are transferred from an ultrasound system using standard network connections to be stored on PDAS.

Images may be stored into PDAS via network transfer. Once studies have been transferred to PDAS they may be reviewed, have reports created for them, and be accessed via Query/Retrieve.

[1] Performed Procedures consist of images and reports from the ultrasound system.

## 2.1 APPLICATION DATA FLOW DIAGRAM

The diagram in Figure 2-1 represents the relationship between PDAS's real-world activities and the remote AE's built into the ultrasound systems that PDAS communicates with using DICOM.

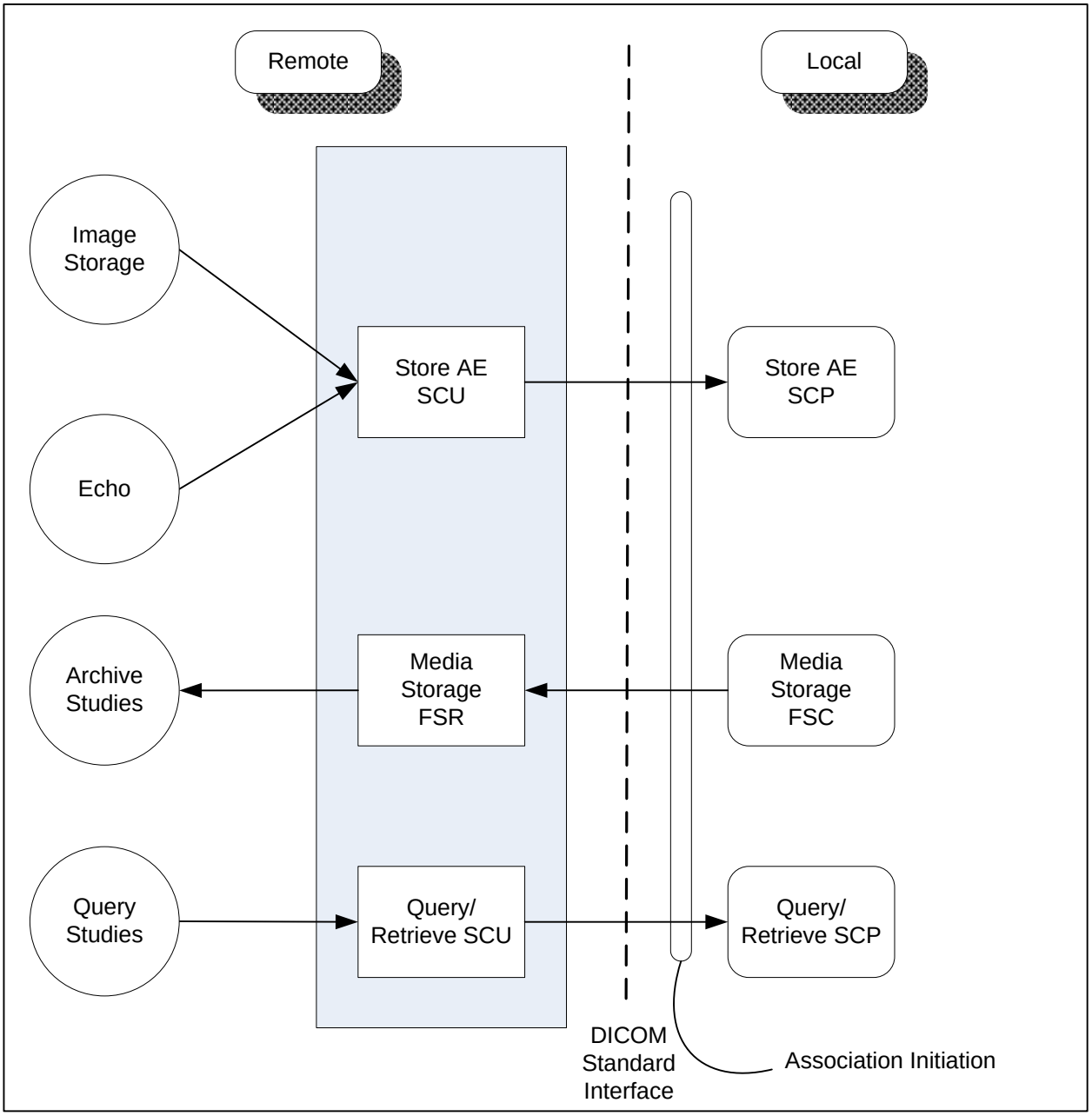


**Figure 2-1 Implementation Model**

The following are the conditions that invoke real-world activities associated with AE's.

**Image Storage**

- Ultrasound system transfers images via C-Store.

**Echo**

- Ultrasound system initiates C-Echo.

**Archive Studies**

- PDAS Administrator selects one or more studies to be archived via DICOMDIR

**Query Studies**

- Workstation user constructs query for one or more images that may be stored by PDAS via C-FIND, selected images are then transferred via C-MOVE

## 2.2 FUNCTIONAL DEFINITIONS OF AE'S

**Store**

This AE handles receiving ultrasound images from an ultrasound system using the DICOM store SCP services.

Steps taken for Echo operation:

A-ASSOCIATE
C-ECHO command
A-RELEASE

Steps taken for image storage operation:

A-ASSOCIATE
for each exam image
{
    C-STORE Image SOP Instance
}
A-RELEASE

Steps taken for image query/retrieve operation:

A-ASSOCIATE
To find images of interest
{
    C-FIND
}
A-RELEASE

A-ASSOCIATE
To transfer images of interest
{
    C-MOVE
}

A-RELEASE

## 2.3 SEQUENCING OF REAL-WORLD ACTIVITIES

All real world activities that initiate communication to local AE's operate asynchronously with respect to each other and Workflow activities.

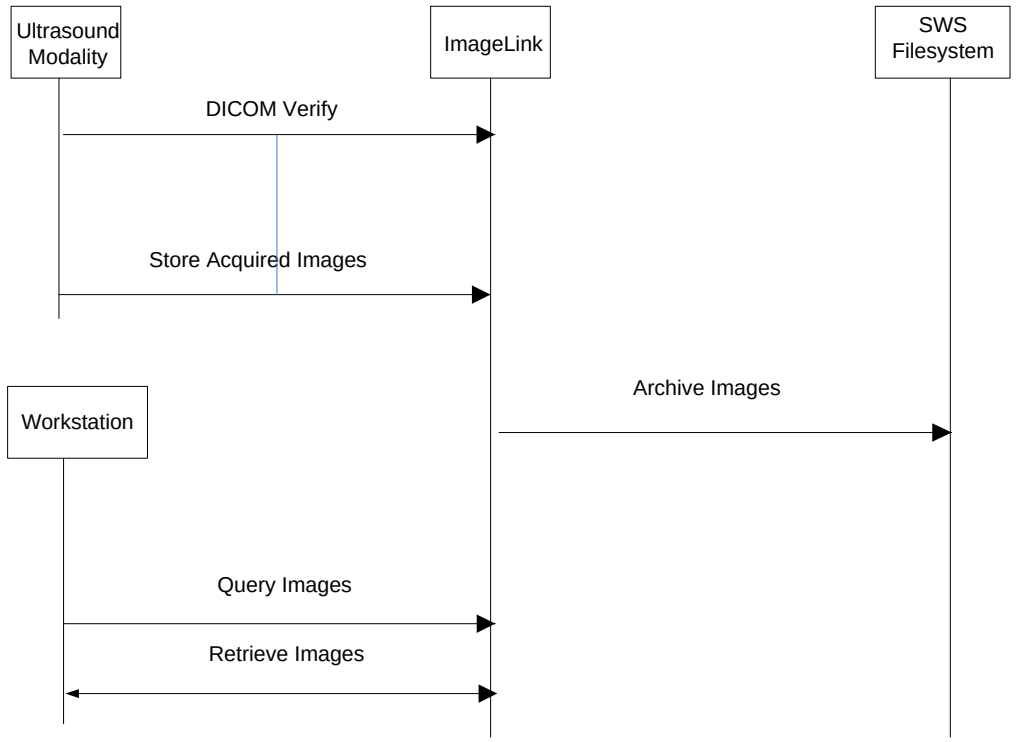


**Figure 2-2 PDAS Sequencing of Real World Activities**

Under normal conditions the sequencing constraints illustrated apply:

1. DICOM Verify conducted to ensure proper system setup.
2. Images transferred from Ultrasound System
3. Image Archive creates DICOMDIR on PDAS filesystem

# 3 AE SPECIFICATIONS

## 3.1 STORE AE – SPECIFICATION

The Store AE provides conformance to the following DICOM V3.0 SOP Classes as an SCP:

**Table 3-1 Store AE SOP Class Support**

| SOP Class Name | SOP Class UID | Conformance Level |
|---|---|---|
| Verification | 1.2.840.10008.1.1 | Standard |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | Standard |
| Ultrasound Multi-Frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | Standard |
| Encapsulated CDA Storage | 1.2.840.10008.5.1.4.1.1.104.2 | Standard |
| Basic Text SR Storage | 1.2.840.10008.5.1.4.1.1.88.11 | Standard |
| Patient Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Standard |
| Patient Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Standard |
| Study Root Query/Retrieve Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Standard |
| Study Root Query/Retrieve Information Model - MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Standard |

### 3.1.1 ASSOCIATION ESTABLISHMENT POLICIES

The Store AE will accept an association from a device in response to the following real-world activities: Image Storage or Verify.

#### 3.1.1.1 GENERAL

Maximum PDU size the Store AE can receive: 131,072 bytes
This is the maximum PDU size the Store AE can receive and is the value offered for the maximum PDU size in the Association Request command. Once the Association is open if the Store AE receives a PDU that is larger than this value then the Association will be aborted.

Maximum PDU size the Store AE can send: 1,048,576 bytes
This is the maximum PDU size the Store AE can be configured to send. The maximum PDU size sent on any Store AE Association will be the smaller of the configured value and the maximum PDU size received in the Association Accept response.

#### 3.1.1.2 NUMBER OF ASSOCIATIONS

Number of simultaneous associations for the Store AE:

There is no enforced limit. System configuration (CPU, memory, storage) contribute to practical limitations.

#### 3.1.1.3 ASYNCHRONOUS NATURE

The Store AE does not use asynchronous operations.

#### 3.1.1.4 IMPLEMENTATION IDENTIFYING INFORMATION

Implementation Class UID: "1.2.840.114340.05.0.0.1"
Implementation Version name: "FFSS_PDAS_001"

Note: "114340" is registered by SonoSite with ANSI. Version name will be used initially as shown, but is subject to change with new versions of the DICOM capable application software.

### 3.1.2 ASSOCIATION INITIATION POLICY

The Store AE does not initiate Associations.

### 3.1.3 ASSOCIATION ACCEPTANCE POLICY

The Store AE will accept Associations from remote ultrasound systems based on the real world activities particular to that system.

#### 3.1.3.1 EXTERNAL AE REQUESTS ULTRASOUND IMAGE STORAGE

The Image Storage real-world activity initiated by an ultrasound system will cause the Store AE to accept associations and respond accordingly.

#### 3.1.3.2 EXTERNAL AE REQUESTS VERIFICATION

The Echo command real-world activity initiated by an ultrasound system will cause the Store AE to accept associations and respond accordingly.

### 3.1.4 ACCEPTED PRESENTATION CONTEXTS

**Table 3-2 Store AE Accepted Presentation Contexts**

| Presentation Context Table | | | | | |
|---|---|---|---|---|---|
| Abstract Syntax | | Transfer Syntax | | Role | Extended Negotiation |
| Name | UID | Name List | UID List | | |
| Verification | 1.2.840.10008.1.1 | Implicit VR Little Endian | 1.2.840.10008.1.2 | SCP | None |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | Implicit VR Little Endian<br>Explicit VR Little Endian<br>JPEG Baseline (Process 1) | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.4.50 | SCP | None |
| Ultrasound Multi-Frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | Implicit VR Little Endian<br>Explicit VR Little Endian<br>JPEG Baseline (Process 1) | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.4.50 | SCP | None |
| Encapsulated CDA Storage | 1.2.840.10008.5.1.4.1.1.104.2 | Implicit VR Little Endian<br>Explicit VR Little Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1 | SCP | None |
| Basic Text SR Storage | 1.2.840.10008.5.1.4.1.1.88.11 | Implicit VR Little Endian<br>Explicit VR Little Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1 | SCP | None |
| Patient Root Q/R-FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Implicit VR Little Endian<br>Explicit VR Little Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1 | SCP | None |
| Study Root Q/R-FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Implicit VR Little Endian<br>Explicit VR Little Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1 | SCP | None |
| Patient Root Q/R-MOVE | 1.2.840.10008.5.1.4.1.2.1.2 | Implicit VR Little Endian<br>Explicit VR Little Endian | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.4.50 | SCP | None |

| | | | | | |
|---|---|---|---|---|---|
| Study Root Q/R-MOVE | 1.2.840.10008.5.1.4.1.2.2.2 | Implicit VR Little Endian<br>Explicit VR Little Endian<br><br>If the image is stored compressed then JPEG Baseline (Process 1) transfer syntax will be negotiated. Otherwise Explicit VR Little Endian will be tried. | 1.2.840.10008.1.2<br>1.2.840.10008.1.2.1<br><br>1.2.840.10008.1.2.4.50 | SCP | None |

#### 3.1.4.1 VERIFICATION SOP CLASS

The Store AE provides standard conformance to the Verification SOP Class as an SCP.

#### 3.1.4.2 ULTRASOUND IMAGE STORAGE SOP CLASS

The Store AE provides standard conformance to the Ultrasound Image Storage SOP Class as an SCP.

#### 3.1.4.3 ULTRASOUND MULTI-FRAME IMAGE STORAGE SOP CLASS

The Store AE provides standard conformance to the Ultrasound Multi-Frame Image Storage SOP Class as an SCP.

#### 3.1.4.4 ENCAPSULATED CDA STORAGE SOP CLASS

The Store AE provides standard conformance to the Encapsulated CDA Storage SOP Class as an SCP.

#### 3.1.4.5 BASIC TEXT SR STORAGE SOP CLASS

The Store AE provides standard conformance to the Basic Text SR Storage SOP Class as an SCP.

#### 3.1.4.6 PATIENT ROOT QUERY/RETRIEVE INFORMATION MODEL - FIND SOP CLASS

The Store AE provides standard conformance to the Patient Root Query/Retrieve Information Model - FIND as an SCP.

#### 3.1.4.7 STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL - FIND SOP CLASS

The Store AE provides standard conformance to the Study Root Query/Retrieve Information Model - FIND as an SCP.

#### 3.1.4.8 PATIENT ROOT QUERY/RETRIEVE INFORMATION MODEL - MOVE SOP CLASS

The Store AE provides standard conformance to the Patient Root Query/Retrieve Information Model - MOVE as an SCP.

#### 3.1.4.9 STUDY ROOT QUERY/RETRIEVE INFORMATION MODEL - MOVE SOP CLASS

The Store AE provides standard conformance to the Study Root Query/Retrieve Information Model - MOVE as an SCP.

### 3.1.5 STORE AE BEHAVIOR TO C-STORE STATUS

Table 3-3 describes the behavior for C-Store response status returned from the Storage SCP. All SOP classes supported by the Store AE exhibit the same behavior.

**Table 3-3 Store AE Behavior to C-Store Status**

| Service Status | Further Meaning | Status Codes | Store AE Behavior |
|---|---|---|---|
| Success | | 0000 | The Composite SOP Instance was successfully received and stored in the system repository. |
| Failure | Refused: Out of Resources | A700 | This status is returned if resources are unavailable to complete an operation that is not enumerated below. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| | Refused: Out of Resources – No DICOM storage directory available | A701 | This status is returned if DICOM storage directory is unavailable. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| | Refused: Out of Resources – No root storage directory available | A702 | This status is returned if root storage directory is unavailable. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| | Refused: Out of Resources – No resource directory available | A704 | This status is returned if the resource directory used for processing datasets is unavailable. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| | Refused: Out of Resources – No filename available | A708 | This status is returned if a filename for storage cannot be created. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |

| | | |
|---|---|---|
| Refused: Out of Resources – Out of memory | A710 | This status is returned if memory cannot be allocated by the operating system. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| Refused: Out of Resources – Cannot get database lock | A720 | This status is returned if the request to lock the database fails. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| Refused: Out of Resources – Image size too large | A730 | This status is returned if there is not enough memory to create the transformed image. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| Refused: Out of Resources – Cannot add database record | A740 | This status is returned if the index record cannot be added to the database. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| Refused: Out of Resources – No database handle | A750 | This status is returned if the handle to the database does not exist. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| Refused: Out of Resources – Cannot write DICOM file | A760 | This status is returned if the DICOM file cannot be written to the filesystem The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| Refused: Out of Resources – Multimedia output directory is invalid | A770 | This status is returned if the created multimedia output directory is invalid. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |

| | | | |
|---|---|---|---|
| | Refused: Out of Resources – Cannot load resourced | A780 | This status is returned if the resources necessary to process a dataset into multimedia format are unavailable. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| | Error: Data Set does not match SOP class | A900 | This status is returned if the C-STORE Request specifies Attributes that are not specific as part of the Storage SOP class. The appropriate SUCCESS Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| | Error: Cannot Understand | C000 | This status is returned a failure is detected while processing DICOM the dataset. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| | Error: Cannot Understand – Cannot load file | C010 | This status is returned if the DICOM file cannot be loaded during database operations. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| | Error: Cannot Understand – Unsupported character set | C011 | This status is returned if the DICOM dataset contains an unsupported character set. The appropriate Status will be sent in the C-STORE Response. Error indication message is output to the Service Log. |
| Warning | Coercion of data elements | B000 | This status is returned if one or more Attribute values were coerced/ modified on reception. Image transmission is considered successful. The appropriate SUCCESS Status will be sent in the C-STORE Response. Warning indication message is output to the Service Log. |
| | | | |

### 3.1.6 STORE AE BEHAVIOR TO C-FIND STATUS

Table 3-4 describes the behavior for C-Find response status returned from the Storage SCP. All Query SOP classes supported by the Store AE exhibit the same behavior.

**Table 3-4 Store AE Behavior to C-Find Status**

| Service Status | Further Meaning | Status Codes | Store AE Behavior |
|---|---|---|---|
| Success | | 0000 | Matching is complete. No final identifier is supplied |
| Pending | | FF00 | Matches are continuing. |
| Failure | Refused: Out of Resources – Out of memory | A710 | This status is returned if memory cannot be allocated by the operating system. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |
| | Refused: Out of Resources – No database handle | A750 | This status is returned if the handle to the database does not exist. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |
| | Refused: Out of Resources – Cannot get shared database lock | A770 | This status is returned if the request to lock the database fails. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |
| | Refused: Out of Resources – Can't make DICOM element | A780 | This status is returned if there are issues creating a tag of the requested response dataset. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |
| | Refused: SOP class not supported | A800 | This status is returned if the C-FIND Request specifies a SOP class UID that is not supported. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |
| | Error: Data Set does not match SOP class | A900 | This status is returned if the C-FIND Request specifies Attributes that are not specific as part of the C_FIND SOP class or necessary ones are missing. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |

| | | |
|---|---|---|
| Failure: Unable to Process | C000 | This status is returned when a failure is detected while processing the query parameters for a match in the database. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |
| Failure: Unable to Process – Invalid Search Root | C010 | This status is returned if the DICOM file cannot be loaded during database operations. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |
| Failure: Unable to Process – Matching Function Failure | C011 | This status is returned when a failure is detected while processing the query parameters for a match in the database. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |
| Failure: Unable to Process – Cannot put string result into requested element | C012 | This status is returned when a failure is detected while trying to load a return string value into a requested element of the return dataset. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |
| Failure: Unable to Process – Cannot put result into requested element | C014 | This status is returned when a failure is detected while trying to load a return value into a requested non-string element of the return dataset. The appropriate Status will be sent in the C-FIND Response. Error indication message is output to the Service Log. |

### 3.1.7 STORE AE BEHAVIOR TO C-MOVE STATUS

Table 3-5 describes the behavior for C-Move response status returned from the Storage SCP. All Move SOP classes supported by the Store AE exhibit the same behavior.

**Table 3-5 Store AE Behavior to C-Move Status**

| Service Status | Further Meaning | Status Codes | Store AE Behavior |
|---|---|---|---|
| Success | | 0000 | Sub-operations complete – No failures |
| Pending | | FF00 | Sub-operations are continuing. |

| | | | |
|---|---|---|---|
| Cancel | | FE00 | Sub-operations terminated due to Cancel Indication |
| Warning | | B000 | Sub-operations Complete - One or more Failures |
| Failure | Refused: Out of Resources – Unable to calculate number of matches | A701 | The appropriate Status will be sent in the C-MOVE Response. Error indication message is output to the Service Log. |
| | Refused: Out of Resources – Unable to perform sub-operations | A702 | The appropriate Status will be sent in the C-MOVE Response. Error indication message is output to the Service Log. |
| | Refused: Out of Resources – No database handle | A750 | This status is returned if the handle to the database does not exist. The appropriate Status will be sent in the C-MOVE Response. Error indication message is output to the Service Log. |
| | Refused: Out of Resources – Out of Memory | A760 | This status is returned if there is not enough system memory to complete the operation. The appropriate Status will be sent in the C- MOVE Response. Error indication message is output to the Service Log. |
| | Refused: Out of Resources – Cannot get shared database lock | A770 | This status is returned if the request to lock the database fails. The appropriate Status will be sent in the C- MOVE Response. Error indication message is output to the Service Log. |
| | Refused: Move Destination unknown | A801 | The appropriate Status will be sent in the C- MOVE Response. Error indication message is output to the Service Log. |
| | Error: Identifier does not match SOP class | A900 | The appropriate Status will be sent in the C- MOVE Response. Error indication message is output to the Service Log. |
| | Failure: Unable to Process – Invalid Search Root | C010 | This status is returned if the search root specified is not known. The appropriate Status will be sent in the C- MOVE Response. Error indication message is output to the Service Log. |

| | | |
|---|---|---|
| Failure: Unable to Process – Matching Function Failure | C011 | This status is returned when a failure is detected while processing the query parameters for a match in the database. The appropriate Status will be sent in the C- MOVE Response. Error indication message is output to the Service Log. |
| Failure: Unable to Process – Out of Memory | C900 | This status is returned if there is not enough system memory to generate the move request. The appropriate Status will be sent in the C- MOVE Response. Error indication message is output to the Service Log. |
| Failure: Unable to Process – Cannot read index record | CA00 | This status is returned when a failure is detected while trying to read the database for informational content. The appropriate Status will be sent in the C-MOVE Response. Error indication message is output to the Service Log. |

### 3.1.8 QUERY/RETRIEVE INFORMATION MODEL ATTRIBUTE SUPPORT

Table 3-6 lists the support for attributes used in the Patient Root Query/Retrieve Information Model and Study Root Query/Retrieve Information Model.

Matching attributes may belong to one of the following types: Unique (U), Required (R), or Optional (O).

**Table 3-6 Query/Retrieve Information Model Attribute Support**

| Root Level | | Patient | | | | Study | | |
|---|---|---|---|---|---|---|---|---|
| Query Level | | Patient | Study | Series | Instance | Study | Series | Instance |
| **Attribute Name** | **Tag** | | | | | | | |
| SOP Instance UID | (0008,0018) | | | | U | | | U |
| Study Date | (0008,0020) | | R | | | R | | |
| Study Time | (0008,0030) | | R | | | R | | |
| Accession Number | (0008,0050) | | R | | | R | | |
| Modality | (0008,0060) | | | R | | | R | |
| Referring Physician's Name | (0008,0090) | | O | | | O | | |
| Study Description | (0008,0090) | | O | | | O | | |
| Name of Physician(s) Reading Study | (0008,1060) | | O | | | O | | |
| Admitting Diagnoses Description | (0008,1080) | | O | | | O | | |
| Patient Name | (0010,0010) | R | | | | R | | |
| Patient ID | (0010,0020) | U | | | | R | | |
| Patient Birth Date | (0010,0030) | O | | | | O | | |
| Patient's Birth Time | (0010,0032) | O | | | | O | | |
| Patient's Sex | (0010,0040) | O | | | | O | | |
| Other Patient Id's | (0010,1000) | O | | | | O | | |
| Other Patient Names | (0010,1001) | O | | | | O | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Patient's Age | (0010,1010) | | O | | | | | |
| Patient's Size | (0010,1020) | | O | | | | | |
| Patient's Weight | (0010,1030) | | O | | | | | |
| Ethnic Group | (0010,2160) | O | | | | O | | |
| Occupation | (0010,2180) | | O | | | | | |
| Additional Patient History | (0010,21B0) | | O | | | | | |
| Patient Comments | (0010,4000) | O | | | | O | | |
| Study ID | (0020,0010) | | R | | | R | | |
| Series Number | (0020,0011) | | | R | | | R | |
| Instance Number | (0020,0013) | | | | R | | | R |
| Study Instance UID | (0020,000D) | | U | | | U | | |
| Series Instance UID | (0020,000E) | | | U | | | U | |
| Other Study Numbers | (0020,1070) | | O | | | | | |
| Number of Patient Related Studies | (0020,1200) | O | | | | O | | |
| Number of Patient Related Series | (0020,1202) | O | | | | O | | |
| Number of Patient Related Instances | (0020,1204) | O | | | | O | | |
| Number of Study Related Series | (0020,1206) | | O | | | | O | |
| Number of Study Related Instances | (0020,1208) | | O | | | | O | |

## 3.2 MEDIA EXPORT AE – SPECIFICATION

### 3.2.1 INTRODUCTION

This section of the conformance statement specifies the PDAS compliance to DICOM Media Storage. It details the roles supported by this product.

PDAS is able to export DICOM images to a specified file location.

### 3.2.2 IMPLEMENTATION MODEL

The Media Export AE saves Ultrasound images to a specified file location. It is associated with the local real-world activity "Archive Studies". "Archive Studies" is performed upon administrator request for selected patient studies.

#### 3.2.2.1 APPLICATION DATA FLOW


**Figure 3-1 Media Export Data Flow**

#### 3.2.2.2 FUNCTIONAL DEFINITION OF THE AE

PDAS can perform the following functions:

- Create a new DICOM file-set

#### 3.2.2.3 SEQUENCING OF REAL-WORLD ACTIVIITIES

Not applicable.

#### 3.2.2.4 FILE META INFORMATION OPTIONS (SEE PS 3.10)

The implementation information written to the File Meta Header in each file is:

Implementation Class UID: "1.2.840.114340.05.0.0.1"
Implementation Version name: "FFSS_PDAS_001"

Note: "114340" is registered by SonoSite with ANSI. Version name will be used initially as shown, but is subject to change with new versions of the DICOM capable application software.

### 3.2.3 AE SPECIFICATIONS

#### 3.2.3.1 REAL-WORLD ACTIVITIES

##### 3.2.3.1.1 REAL-WORLD ACTIVITY – "ARCHIVE STUDIES"

"Archive Studies" saves the selected studies to the selected file path and creates a DICOM File Set. A new, datestamped folder will be created by PDAS each time an archive operation is initiated, so there will never be any overwriting or updating of a preexisting dataset. The Media Export AE acts as a File Set Creator when requested to export SOP instances from internal storage.

Limitations: The user cannot review or manipulate DICOM files written to the USB medium on the system.

*3.2.3.1.1.1 Media Storage Application Profile for the real-world activity "Archive Studies"*

Not applicable [FUTURE]

3.2.3.1.1.1.1 Options

This Application Entity supports the SOP Classes and Transfer Syntaxes listed below in Table 3-7:

**Table 3-7 SOP Classes and Transfer Syntaxes for Media Export**

| Abstract Syntax | | Transfer Syntax | |
|---|---|---|---|
| **Name** | **UID** | **Name List** | **UID List** |
| Media Storage Directory Storage | 1.2.840.10008.1.3.10 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |
| Ultrasound Image Storage | 1.2.840.10008.5.1.4.1.1.6.1 | Explicit VR Little Endian<br>JPEG Baseline (Process 1) | 1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.4.50 |
| Ultrasound Multi-Frame Image Storage | 1.2.840.10008.5.1.4.1.1.3.1 | Explicit VR Little Endian<br>JPEG Baseline (Process 1) | 1.2.840.10008.1.2.1<br>1.2.840.10008.1.2.4.50 |
| Encapsulated CDA Storage | 1.2.840.10008.5.1.4.1.1.104.2 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |
| Basic Text SR Storage | 1.2.840.10008.5.1.4.1.1.88.11 | Explicit VR Little Endian | 1.2.840.10008.1.2.1 |

Sec. 3.2.4 Common Composite Image IOD Module describes image module usage by PDAS.

### 3.2.4 AUGMENTED AND PRIVATE APPLICATION PROFILES

Not applicable.

### 3.2.5 MEDIA CONFIGURATION

The Application Entity Titles configurable for Media Services are listed below:

Application Entity: “Media Export”

### 3.2.6 MEDIA STORAGE SOP CLASS

The following diagram illustrates the relationship between directory entities in the Basic Directory module produced by PDAS. It is based on the basic DICOM entity relationship model.

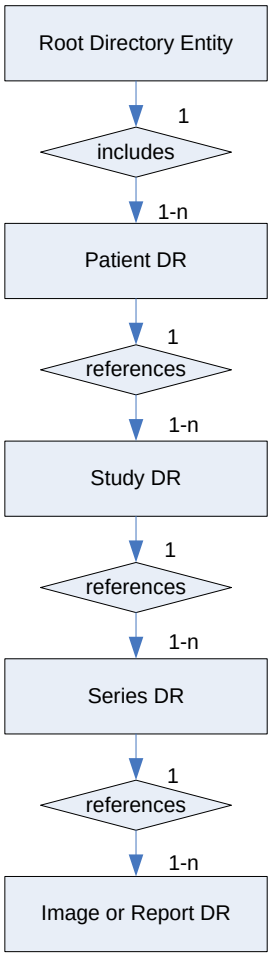


**Figure 3-2 PDAS Directory Entity Relationship Diagram**

The Media Storage SOP Class uses the Basic Directory IOD Modules as shown in Table 3-8.

**Table 3-8 Basic Directory IOD Modules**

| Module | Reference | Usage |
|---|---|---|
| File-set Identification | 3.2.7.1 | M |
| Directory Information | 3.2.7.2 | U |

### 3.2.7 INFORMATION MODULE DEFINITIONS

#### 3.2.7.1 FILE-SET IDENTIFICATION MODULE

Table 3-9 specifies the attributes used from the File-set Identification Module.

**Table 3-9 File-Set Identification Module**

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| File-set ID | (0004,1130) | 2 | "FFSS_EXPORT" |
| File-set Descriptor ID | (0004,1141) | 3 | Not Used |
| Specific Character Set of File-set Descriptor File | (0004,1142) | 1C | Not Used |

#### 3.2.7.2 DIRECTORY INFORMATION MODULE

Table 3-10 specifies the attributes used from the Directory Information Module.

**Table 3-10 Directory Information Module**

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| Offset of the First Directory Record of the Root Directory Entity | (0004,1200) | 1 | See PS 3.3 |
| Offset of the Last Directory Record of the Root Directory Entity | (0004,1202) | 1 | See PS 3.3 |
| File-set Consistency Flag | (0004,1212) | 1 | See PS 3.3 |
| Directory Record Sequence | (0004,1220) | 2 | See PS 3.3 |
| >Offset of the Next Directory Record | (0004,1400) | 1C | See PS 3.3 |
| >Record In-use Flag | (0004,1410) | 1C | See PS 3.3 |
| >Offset of Referenced Lower-Level Directory Entity | (0004,1420) | 1C | See PS 3.3 |
| >Directory Record Type | (0004,1430) | 1C | PDAS Supported Values: PATIENT, STUDY, SERIES, IMAGE, REPORT |
| >Referenced File ID | (0004,1500) | 1C | See PS 3.3 |
| >Referenced SOP Class UID in File | (0004,1510) | 1C | See PS 3.3 |
| >Referenced SOP Instance UID in File | (0004,1511) | 1C | See PS 3.3 |
| >Referenced Transfer Syntax in UID in File | (0004,1512) | 1C | See PS 3.3 |

##### 3.2.7.2.1 PATIENT KEYS

Table 3-11 specifies the additional keys used for directory records of type PATIENT.

**Table 3-11 PATIENT KEYS**

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| Patient's Name | (0010,0010) | 2 | See PS 3.3 |
| Patient ID | (0010,0020) | 1 | See PS 3.3 |
| Patient's Birth Date | (0010,0030) | 3 | See PS 3.3 |
| Patient's Sex | (0010,0040) | 3 | See PS 3.3 |

#### 3.2.7.2.2 STUDY KEYS

Table 3-12 specifies the additional keys used for directory records of type STUDY.

**Table 3-12 STUDY KEYS**

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| Study Date | (0008,0020) | 1 | See PS 3.3 |
| Study Time | (0008,0030) | 1 | See PS 3.3 |
| Study Description | (0008,1030) | 2 | See PS 3.3 |
| Study Instance UID | (0020,000D) | 1C | See PS 3.3 |
| Study ID | (0020,0010) | 1 | See PS 3.3 |
| Accession Number | (0008,0050) | 2 | See PS 3.3 |

#### 3.2.7.2.3 SERIES KEYS

Table 3-13 specifies the additional keys used for directory records of type SERIES.

**Table 3-13 SERIES KEYS**

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| Modality | (0008,0060) | 1 | See PS 3.3 |
| Institution Name | (0008,0080) | 3 | See PS 3.3 |
| Series Instance UID | (0020,000E) | 1 | See PS 3.3 |
| Series Number | (0020,0011) | 1 | See PS 3.3 |

#### 3.2.7.2.4 IMAGE KEYS

Table 3-14 specifies the additional keys used for directory records of type IMAGE.

**Table 3-14 IMAGE KEYS**

| Attribute Name | Tag | Type | Attribute Description |
|---|---|---|---|
| Image Type | (0008,0008) | 3 | See PS 3.3 |
| Instance Number | (0020,0013) | 1 | See PS 3.3 |
| Rows | (0028,0010) | 3 | See PS 3.3 |
| Columns | (0028,0011) | 3 | See PS 3.3 |
| Lossy Image Compression Ratio | (0028,2112) | 3 | See PS 3.3 |

# 4 COMMUNICATION PROFILES

## 4.1 TCP/IP STACK

The TCP/IP protocol is used.

# 5 EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

## 5.1 PRIVATE TRANSFER SYNTAXES

None

# 6 CONFIGURATION

## 6.1 AE TITLE

The PDAS AE Title and networking parameters are configurable in the network setting page. Port number 104 is the default used for DICOM communication.

## 6.2 CONFIGURABLE PARAMETERS

### 6.2.1 PDAS CONFIGURABLE PARAMETERS

These parameters are intended to be configured by a network/DICOM administrator.

- DICOM AE Title (default = SSPDASSCP)
- Port (default = 104)

### 6.2.2 OTHER CONFIGURABLE PARAMETERS

These settings apply independent of network configuration:

- Archive directory (location on the server where DICOMDIR will be created)

# 7 SUPPORT OF EXTENDED CHARACTER SETS

The PDAS system supports the ISO-IR 100 and ISO-IR 192 character sets.