DICOM 3.0 Conformance Statement

for

# DICOM Printer Version 1.6

# 1 Conformance Statement Overview

This DICOM Conformance Statement specifies the behavior and functionality of the DICOM Printer application. This software provides the following features:

- Storage of images and presentation states on a remote DICOM system.
- Querying for data on a remote DICOM system.
- Printing of hardcopies on a remote DICOM print SCP.

**Table 1.1: Overview of the network services provided by DICOM Printer.**

| Name | UID | (SCU) | (SCP) |
|---|---|---|---|
| Verification | | | |
| Verification | 1.2.840.10008.1.1 | Yes | No |
| Transfer | | | |
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | Yes | No |
| Query / Retrieve | | | |
| Patient Root Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Option | No |
| Study Root Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Option | No |
| Workflow Management | | | |
| Modality Worklist Information Model - FIND | 1.2.840.10008.5.1.4.31 | Option | No |
| Print Management | | | |
| Basic Grayscale Print Management (Meta) | 1.2.840.10008.5.1.1.9 | Option | No |
| Basic Annotation Box | 1.2.840.10008.5.1.1.15 | Option | No |
| Presentation LUT | 1.2.840.10008.5.1.1.23 | Option | No |

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# 2 Introduction

Flux DICOM Printer (FDP) is a DICOM enabler, designed to fit into existing healthcare network infrastructure and add DICOM-compliant query and storage functionality to devices that presently lack this capability. As such, FDP permits the querying of remote data and associated remote storage of printed documents and images on an existing PACS. For this purpose, FDP utilizes the DICOM 3.0 protocol to perform both query and store operations against compliant devices.

## 2.1 Revision History

See Table 3.1.

**Table 2.1: Revision history of the DICOM Printer software.**

| Version | Date | Changes |
|---|---|---|
| 1.2 | 2007.09.17 | First revision |
| 1.3.0 | 2007.11.30 | Addition of windowing parameters |
| 1.3.1 | | Implementation of JPEG Lossy and Lossless Transfer Syntaxes |
| 1.4.0 | | |
| 1.4.2 | | SOP Instance UID and Media Storage Instance UID now set to internally-generated values. |
| 1.5.0 | 2008.03.27 | DICOM Print functionality added. |

## 2.2 Audience

This document is written for the people that need to understand how FDP will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

## 2.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between FDP and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability.

The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality. This Conformance Statement is

not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

## 2.4 Definitions, Terms and Abbrevations

### 2.4.1 Definitions

Informal definitions for the following terms used in this Conformance Statement are provided below. The DICOM Standard is the authoritative source for formal definitions of these terms.

**Abstract Syntax** The information that is to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP lass, Modality Worklist Information Model Find SOP Class, and Computed Radiography Image Storage SOP Class.

**Application Entity (AE)** An end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

**Application Entity Title** he externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.

**Application Context** The specification of the type of communication used between Application Entities. Example: DICOM network protocol.

**Association** A network communication channel set up between Application Entities.

**Attribute** A unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence) composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), and Procedure Code Sequence (0008,1032).

**Information Object Definition (IOD)** The specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as Mandatory (Type 1), required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

**Joint Photographic Experts Group (JPEG)** A set of standardized image compression techniques, available for use by DICOM applications.

**Media Application Profile** The specification of DICOM information objects and encoding exchanged on removable media (e.g. CDs).

**Module** A set of Attributes within an Information Object Definition that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

**Negotiation** First phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.

**Presentation Context** The set of DICOM network services used over an Association, as negotiated between Application Entities; includes Abstract Syntaxes and Transfer Syntaxes.

**Protocol Data Unit (PDU)** A packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

**Security Profile** A set of mechanisms, such as encryption, user authentication, or digital signatures, used by an Application Entity to ensure confidentiality, integrity, and/or availability of exchanged DICOM data.

**Service Class Provider (SCP)** Role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

**Service Class User (SCU)** Role of an Application Entity that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU).

**Service/Object Pair (SOP) Class** The specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

**Service/Object Pair (SOP) Instance** An information object; a specific occurrence of information exchanged in a SOP Class. Examples: a specific x-ray image.

**Tag** A 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element].

**Transfer Syntax** The encoding used for exchange of DICOM information objects and messages. Examples: JPEG compressed (images), Little Endian explicit value representation.

**Unique Identifier (UID)** A globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

**Value Representation (VR)** The format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

### 2.4.2 Abbrevations and Acronyms

TODO: This shouldn't be longtable but a simple tabular. When the contents of the document is finished, get rid of unused acronyms.

**Table 2.2: Abbreviations and Acronyms.**

| Abbreviation or Acronym | Definition |
|---|---|
| AE | Application Entity |
| CDA | Clinical Document Architecture |
| CD-R | Compact Disk Recordable |
| CR | Computed Radiography |
| CT | Computed Tomography |
| DHCP | Dynamic Host Configuration Protocol |
| DICOM | Digital Imaging and Communications in Medicine |
| DIT | Directory Information Tree (LDAP) |
| DNS | Domain Name System |
| HIS | Hospital Information System |
| HL7 | Health Level 7 Standard |
| IHE | Integrating the Healthcare Enterprise |
| IOD | Information Object Definition |
| IPv4 | Internet Protocol version 4 |
| IPv6 | Internet Protocol version 6 |
| ISO | International Organization for Standards |
| JPEG | Joint Photographic Experts Group |
| LUT | Look-up Table |
| MTU | Maximum Transmission Unit (IP) |
| MWL | Modality Worklist |
| OSI | Open Systems Interconnection |
| PACS | Picture Archiving and Communication System |
| PDU | Protocol Data Unit |
| RIS | Radiology Information System |
| SC | Secondary Capture |
| SCP | Service Class Provider |
| SCU | Service Class User |
| SOP | Service-Object Pair |
| SPS | Scheduled Procedure Step |
| TCP/IP | Transmission Control Protocol/Internet Protocol |

## 2.5 References

The following documents are referenced in this conformance statement:

**Table 2.3: Documents Referenced in this Conformance Statement.**

| Name | Description |
|---|---|
| Nema PS3 | Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/ |

## 2.6 Basics of DICOM Communication

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted in italics below. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two Application Entities (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network "handshake". One of the two devices must initiate an Association (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (Negotiation).

DICOM specifies a number of network services and types of information objects, each of which is called an Abstract Syntax for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted Transfer Syntaxes. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called Presentation Contexts. The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on Roles – which one is the Service Class User (SCU - client) and which is the Service Class Provider (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (PDU) size, security information, and network service options (called Extended Negotiation information).

The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate Information Object Definition, and sent using the negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. The receiver explicitly acknowledges each transfer with a Response Status indicating success, failure, or that query or retrieve operations are still in process.

Two Application Entities may also communicate with each other by exchanging media (such as a CD-R). Since there is no Association Negotiation possible, they both use a Media Application Profile that specifies "pre-negotiated" exchange media format, Abstract Syntax, and Transfer Syntax.

## 2.7 How to use this document

This Conformance Statement consists of the following chapters:

**4: Networking** Consists of two main sections:

**4.1: Implementation Model** The first section describes the Implementation Model. It explains the functional relation between the device and the DICOM services. A DICOM service is implemented on a device by a software process, which is called an "Application Entity" (AE). Each AE has a unique name called the "AE Title" which is used to identify it to other AEs. The AE Title is configurable to avoid two devices with the same name on a network. The "bubble diagram" (Application Data Flow Diagram) shows the interaction of the AE with the outside world across the dashed line, i. e. the DICOM interface. This Application Data Flow Diagram depicts graphically the relationship of the DICOM AE with local functions at the workstation as well as the relationship with external activities. One should compare this implementation model and its description with the model of the other devices that the DICOMscope software will connect to in order to determine connectivity.

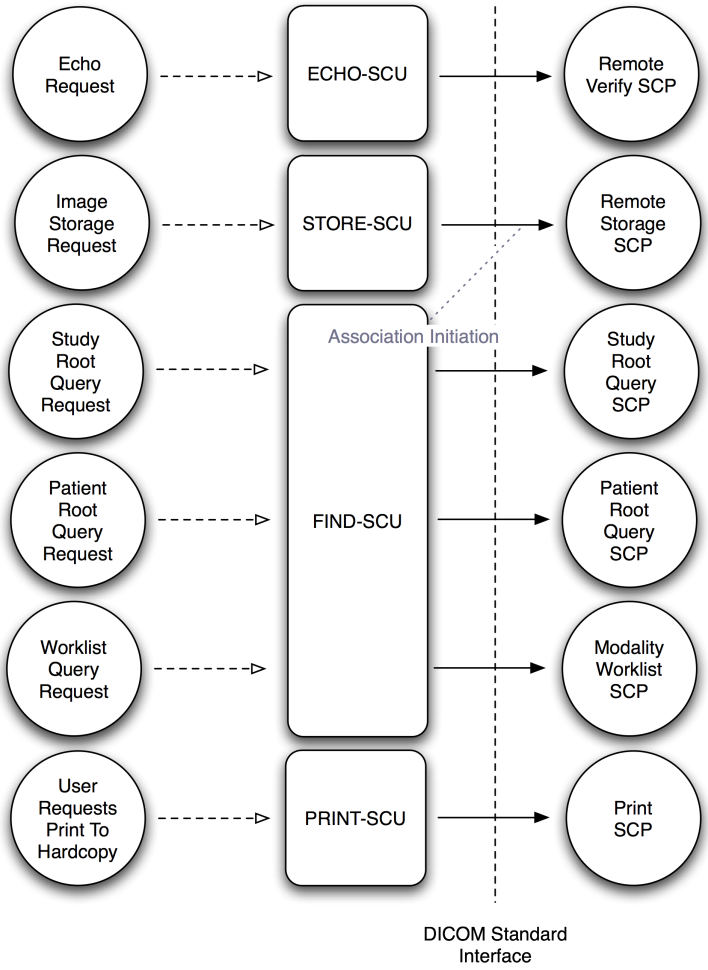
**4.2: AE Specifications** Each AE supports one or more Service Object Pair (SOP) classes. A SOP class consists of a combination of an object or information model with specific DICOM services. An example of such a SOP class is the CT Image Storage Class, which consists of the combination of the DICOM C_STORE command with the CT image object. Each of these classes is uniquely identified by an Identification number (UID), which is issued by the NEMA. The role of the AE is specified, which can be a client or server (compare with a speaker or listener). In DICOM terms, this is called a Service Class User or Service Class Provider (SCU or SCP). In order to interconnect with another device, the SOP classes as well as their role (SCU or SCP) have to be matched, i. e. a SCU has to match a SCP at another device with an identical SOP class. Make sure to compare the UID itself, not the description because there are SOP classes which have the same name, but support a different (newer) object. Each SOP class supports a particular presentation context which is the combination of the SOP Class and the transfer syntax. The transfer syntax defines the encoding of the DICOM basic elements, i. e. its attributes and how the data is represented. The encoding of the data type, or Value Representation (VR), can be done in two ways – implicitly or explicitly. Explicit VR means that the transmitted data will include the VR information along with data and attribute tags. Implicit VR means the VR information will not be included, and the receiving application must determine the VR type from the Attribute Tag. In addition, the data can be communicated in the Little Endian (Intel) or Big Endian (Motorola, Sparc, MIPS) byte ordering. This means that for certain 16 bit words, the two 8 bit bytes might have to be swapped to be able to interpret the information by a different device. The transfer syntax of two devices have to match in order to communicate.

**5: Support of Extended Character Sets** DICOM supports a large number of character sets, including ASCII (the default), some of the ISO 8859 character sets for use with most European languages and a number of character sets for use in the Far East. This section of the conformance statement specifies the character sets that an implementation actually supports. The supported character sets should be compared carefully if extended character sets are to be used, since the inability of a system to handle extended characters might affect the way names and identifiers can be entered, displayed, queried etc.

# 3 Networking

## 3.1 Implementation model

### 3.1.1 Application Flow Diagram




### 3.1.2 Functional Definitions of AE's

#### 3.1.2.1 Echo SCU

The user activates Echo SCU in order to verify remote application entity configuration parameters. Verification is possible for each remote application added to the configuration, as well as any print SCP entities defined. Only one request is made, if it fails, no retry will be performed.

#### 3.1.2.2 Find SCU

The user activates Find SCU in order to query for matching studies or worklist against one or more remote AEs. Requests are always handled synchronously.

#### 3.1.2.3 Store SCU

Store SCU is initiated by the user, and activated in the background, always synchronously, when the user requests that images to be sent to a remote AE, which is selected from a configured list. Store SCU will only make a single attempt at association; if it fails, then another user request is required to commence another attempt.

#### 3.1.2.4 Print SCU

Print SCU is an application entity that implements the DICOM Print Management Service Class as an SCU. The user activates PRINT SCU when a request to produce a hardcopy is made. When the user requests a print to a particular printer, PRINT SCU attempts to spool the print job. If DICOM Printer is terminated, the print job will continue to be transmitted until it is completed or aborted.

### 3.1.3 Sequencing of Real-World Activities

All activities occur as a direct result of user request and have no pre-set sequence. However, in a typical use, Query will precede store or print, and the later two are generally mutually exclusive.

## 3.2 AE Specifications

### 3.2.1 Echo SCU

#### 3.2.1.1 SOP Classes

This application entity provides standard conformance to the DICOM SOP classes given in Table 4.1.

**Table 3.1: SOP Classes used by Echo SCU.**

| Name | UID | (SCU) | (SCP) |
|---|---|---|---|
| Verification | 1.2.840.10008.1.1 | Yes | No |

#### 3.2.1.2 Association Policies

##### 3.2.1.2.1 General

The DICOM standard application context name, which is always proposed, is given in Table 4.2.

**Table 3.2: Application context name proposed by all AE's.**

| | |
|---|---|
| Application Context Name | 1.2.840.10008.3.1.1.1 |

#### 3.2.1.2.2 Number of Associations

Echo SCU will only propose a single association. However, multiple instances of Echo SCU may be running at the same time. The number of parallel instances is only limited by the resources of the underlying operating system. See Table 4.3.

**Table 3.3: Number of Associations for Echo SCU.**

| | |
|---|---|
| Maximum number of simultaneous Associations | 1 |

#### 3.2.1.2.3 Asychronous Nature

Echo SCU will only allow a single outstanding operation on an Association. Therefore, Echo SCU will not perform asynchronous operations window negotiation.

#### 3.2.1.2.4 Implementation Identifying Information

See Table 4.4.

**Table 3.4: DICOM implementation class and version for all AE's.**

| | |
|---|---|
| Implementation Class UID | 1.2.826.0.1.3680043.2.1635.0.1.0.1 |
| Implementation Version Name | FLUX_DICOM_101 |

### 3.2.1.3 Association Initiation Policy

Echo SCU attempts to initiate a new association when the user performs the test action from the user interface.

#### 3.2.1.3.1 Activity - Test

##### 3.2.1.3.1.1 Description and Sequencing of Activities

A single attempt will be made to verify connection to the remote AE. If the test fails, for whatever reason, no retry will be performed.

#### 3.2.1.3.1.2 Proposed Presentation Contexts

The default behavior of the Echo SCU is to propose for each of the supported SOP classes a single presentation context containing transfer syntaxes given in Table 4.5.

**Table 3.5: Proposed presentation context for Echo SCU.**

| Abstract Syntax | | Transfer Syntax | | Role | Extendent Negotiation |
|---|---|---|---|---|---|
| Name | UID | Name | UID | | |
| See Table 4.1 | See Table 4.1 | Implicit Little Endian | 1.2.840.10008.1.2 | SCU | None |

#### 3.2.1.3.1.3 SOP Specific Conformance

##### 3.2.1.3.1.3.1 SOP Specific Conformance to Verification SOP Class

Echo SCU provides standard conformance to the Verification Service Class.

### 3.2.1.4 Association Acceptance Policy

Echo SCU does not accept associations.

## 3.2.2 Find SCU

### 3.2.2.1 SOP Classes

This application entity provides standard conformance to the DICOM SOP classes given in Table 4.6.

**Table 3.6: SOP Classes used by Find SCU.**

| Name | UID | (SCU) | (SCP) |
|---|---|---|---|
| Patient Root Information Model - FIND | 1.2.840.10008.5.1.4.1.2.1.1 | Option | No |
| Study Root Information Model - FIND | 1.2.840.10008.5.1.4.1.2.2.1 | Option | No |
| Modality Worklist Information Model - FIND | 1.2.840.10008.5.1.4.31 | Option | No |

### 3.2.2.2 Association Policies

#### 3.2.2.2.1 General

The DICOM standard application context name, which is always proposed, is given in Table 4.2.

#### 3.2.2.2.2 Number of Associations

Find SCU will only propose a single association. See Table 4.7.

**Table 3.7: Number of Associations for Find SCU.**

| | |
|---|---|
| Maximum number of simultaneous Associations | 1 |

#### 3.2.2.2.3 Asychronous Nature

Find SCU will only allow a single outstanding operation on an Association. Therefore, Find SCU will not perform asynchronous operations window negotiation.

#### 3.2.2.2.4 Implementation Identifying Information

See Table 4.4.

### 3.2.2.3 Association Initiation Policy

Find SCU attempts to initiate a new association when the user performs the query action from the user interface.

#### 3.2.2.3.1 Activity - Search

##### 3.2.2.3.1.1 Description and Sequencing of Activitiesy

A single attempt will be made to query the remote AE. If the query fails, for whatever reason, no retry will be performed.

##### 3.2.2.3.1.2 Proposed Presentation Contexts

The default behavior of the Print SCU is to propose for each of the supported SOP classes a single presentation context containing transfer syntaxes given in Table 4.8.

**Table 3.8: Proposed presentation context for Find SCU.**

| Abstract Syntax | | Transfer Syntax | | Role | Extendent |
|---|---|---|---|---|---|
| Name | UID | Name | UID | | Negotiation |
| See Table 4.6 | See Table 4.6 | Implicit Little Endian | 1.2.840.10008.1.2 | SCU | None |

##### 3.2.2.3.1.3 SOP Specific Conformance

###### 3.2.2.3.1.3.1 SOP Specific Conformance to C-FIND SOP Classes

Find SCU provides standard conformance to the supported C-FIND SOP Classes.
It supports three information models: Patient Root, Study Root and Modality Worklist.
No CANCEL requests are ever issued.

Search parameters for each C-FIND SOP Class are listed in Table 4.9.

**Table 3.9: Request Identifier for Find SCU.**

| Name | Tag | Types of Matching |
|---|---|---|
| PATIENT | | |
| Patient's Name | (0010,0010) | S,*,U |
| STUDY | | |
| Accession number | (0008,0050) | S,*,U |
| Patient ID | (0010,0020) | S,*,U |
| MODALITY WORKLIST | | |
| Modality | (0008,0060) | S,*,U |

**Types of Matching** The types of Matching supported by the C-FIND SCU. An "S" indicates the identifier attribute uses Single Value Matching, an "*" indicates wildcard matching, a 'U' indicates Universal Matching,

Besides values given in Table 4.9, there are also user-configurble tags in configuration file. The default list is provided in the Table 4.10.

#### 3.2.2.4 Association Acceptance Policy

Find SCU does not accept associations.

### 3.2.3 Store SCU

#### 3.2.3.1 SOP Classes

This application entity provides standard conformance to the DICOM SOP classes given in Table 4.11.

#### 3.2.3.2 Association Policies

##### 3.2.3.2.1 General

The DICOM standard application context name, which is always proposed, is given in Table 4.2.

##### 3.2.3.2.2 Number of Associations

Store SCU will only propose a single association. However, multiple instances of Store SCU may be running at the same time. The number of parallel instances is only limited by the resources of the underlying operating system. See Table 4.12.

##### 3.2.3.2.3 Asychronous Nature

Store SCU will only allow a single outstanding operation on an Association. Therefore, Store SCU will not perform asynchronous operations window negotiation.

**Table 3.10: Default List of Parameters for Find SCU.**

| Name | Tag |
|---|---|
| COMMON | |
| Accession Number | (0008,0050) |
| Modality | (0008,0060) |
| Study Description | (0008,1030) |
| Full Name | (0010,0010) |
| Patient ID | (0010,0020) |
| Birth Date | (0010,0030) |
| Gender | (0010,0040) |
| Study Instance UID | (0020,000D) |
| Study ID | (0020,0010) |
| Patient's Name | (0010,0010) |
| PATIENT/STUDY ROOT SPECYFIC | |
| Study Date | (0008,0020) |
| Study Time | (0008,0030) |
| Referring Phys | (0008,0090) |
| MODALITY WORKLIST SPECYFIC | |
| Sched. Procedure Step Start Date | (0040,0002) |

**Table 3.11: SOP Classes used by Store SCU.**

| Name | UID | (SCU) | (SCP) |
|---|---|---|---|
| Secondary Capture Image Storage | 1.2.840.10008.5.1.4.1.1.7 | Yes | No |

**Table 3.12: Number of Associations for Store SCU.**

| | |
|---|---|
| Maximum number of simultaneous Associations | 1 |

#### 3.2.3.2.4 Implementation Identifying Information

See Table 4.4.

#### 3.2.3.3 Association Initiation Policy

Store SCU attempts to initiate a new association when the user performs the store action from the user interface.

##### 3.2.3.3.1 Activity - Store

###### 3.2.3.3.1.1 Description and Sequencing of Activities

A single attempt will be made to store image contents in the remote AE. If the operation fails, for whatever reason, no retry will be performed.

###### 3.2.3.3.1.2 Proposed Presentation Contexts

The default behavior of the Store SCU is to propose for each of the supported SOP classes a single presentation context containing the transfer syntaxes given in Table 4.13.

**Table 3.13: Proposed presentation context for Store SCU.**

| Abstract Syntax | | Transfer Syntax | | Role | Extendent |
|---|---|---|---|---|---|
| Name | UID | Name | UID | | Negotiation |
| See Table 4.11 | See Table 4.11 | Implicit Little Endian | 1.2.840.10008.1.2 | SCU | None |
| | | Explicit Little Endian | 1.2.840.10008.1.2.1 | SCU | None |
| | | Explicit VR Big Endian | 1.2.840.10008.1.2.2 | SCU | None |
| | | RLE Compression | 1.2.840.10008.1.2.5 | SCU | None |
| | | JPEG lossy | 1.2.840.10008.1.2.4.51 | SCU | None |
| | | JPEG lossless 14 SV1 | 1.2.840.10008.1.2.4.70 | SCU | None |

###### 3.2.3.3.1.3 SOP Specific Conformance

###### 3.2.3.3.1.3.1 SOP Specific Conformance to Storage SOP Classes

Store SCU provides standard conformance to the Storage Service Class.
Image-specyfic tags e.g. number of rows or columns are based on file properties. However some tags are undetectable and remain constant for all store operations. See Table 4.14 for details.

#### 3.2.3.4 Association Acceptance Policy

Store SCU does not accept associations.

### 3.2.4 Print SCU

#### 3.2.4.1 SOP Classes

This application entity provides standard conformance to the DICOM SOP classes given in Table 4.15.

**Table 3.14: Constant Tags for Store SCU.**

| Name | Tag | Default Value |
|---|---|---|
| Manufacturer | (0008,0070) | FLUX Inc |
| Specific Character Set | (0008,0005) | ISO_IR 100 |
| Window Center | (0028,1050) | 127 |
| Window Width | (0028,1051) | 255 |

**Table 3.15: SOP Classes used by Print SCU.**

| Name | UID | (SCU) | (SCP) |
|---|---|---|---|
| Basic Grayscale Print Management (Meta) | 1.2.840.10008.5.1.1.9 | Option | No |
| Basic Annotation Box | 1.2.840.10008.5.1.1.15 | Option | No |
| Presentation LUT | 1.2.840.10008.5.1.1.23 | Option | No |

#### 3.2.4.2 Association Policies

##### 3.2.4.2.1 General

The DICOM standard application context name, which is always proposed, is given in Table 4.2.

##### 3.2.4.2.2 Number of Associations

Print SCU will only propose a single association. However, multiple instances of Print SCU may be running at the same time. The number of parallel instances is only limited by the resources of the underlying operating system. See Table 4.16.

**Table 3.16: Number of Associations for Print SCU.**

| | |
|---|---|
| Maximum number of simultaneous Associations | 1 |

##### 3.2.4.2.3 Asychronous Nature

Print SCU will only allow a single outstanding operation on an Association. Therefore, Store SCU will not perform asynchronous operations window negotiation.

##### 3.2.4.2.4 Implementation Identifying Information

See Table 4.4.

#### 3.2.4.3 Association Initiation Policy

Print SCU attempts to initiate a new association when the user performs the print action from the user interface.

##### 3.2.4.3.1 Activity - Print

###### 3.2.4.3.1.1 Description and Sequencing of Activities

A single attempt will be made to print image contents on the remote AE. If the operation fails, for whatever reason, no retry will be performed.

###### 3.2.4.3.1.2 Proposed Presentation Contexts

The default behavior of the Print SCU is to propose for each of the supported SOP classes a single presentation context containing the transfer syntaxes given in Table 4.17.

**Table 3.17: Proposed presentation context for Print SCU.**

| Abstract Syntax | | Transfer Syntax | | Role | Extendent |
|---|---|---|---|---|---|
| Name | UID | Name | UID | | Negotiation |
| See Table 4.15 | See Table 4.15 | Implicit Little Endian | 1.2.840.10008.1.2 | SCU | None |

###### 3.2.4.3.1.3 SOP Specific Conformance

###### 3.2.4.3.1.3.1 SOP Specific Conformance for Basic Grayscale Image Box SOP Class

For each Basic Grayscale Image Box created as part of the Basic Film Box, Print SCU issues a single N-SET request for each image box unless there are more image boxes than images to print, in which no N-SET request is sent for the unused image boxes.

###### 3.2.4.3.1.3.2 SOP Specific Conformance for Presentation LUT SOP Class

If support for the Presentation LUT SOP Class has been negotiated, Print SCU creates a Presentation LUT SOP instance immediately after association negotiation.

###### 3.2.4.3.1.3.3 SOP Specific Conformance for Basic Annotation Box SOP Class

If support for the Basic Annotation Box SOP Class has been negotiated and Annotation Boxes have been created as part of the Basic Film Box, Print SCU may issue a single N-SET request for each annotation box.

#### 3.2.4.4 Association Acceptance Policy

Print SCU does not accept associations.

### 3.2.5 Network Interfaces

#### 3.2.5.1 Physical Network Interface

The application is indifferent to the physical medium over which TCP/IP executes; which is dependent on the underlying operating system and hardware.

#### 3.2.5.2 Additional Protocols

No additional protocols are supported.

#### 3.2.5.3 IPv4 and IPv6 Support

This product supports both IPv4 and IPv6. It does not utilize any of the optional configuration identification or security features of IPv6.

### 3.2.6 Configuration

#### 3.2.6.1 AE Title/Presentation Address Mapping

The Calling AE Title of the local application is configurable in the preferences window for each AE. The mapping of the logical name by which remote AEs are described in the user interface to Called AE Titles as well as presentation address (hostname or IP address and port number) is also configurable in this preferences window.

#### 3.2.6.2 Parameters

See Table 4.18.

Table 3.18: Configuration Parameters.

| Parameter | Configurable | Default Value |
|---|---|---|
| General Parameters | | |
| PDU Size | No | 16 KB |
| Time-out waiting for acceptance or rejection Response to an Association Open Request. (Application Level timeout) | No | None |
| General DIMSE level time-out values | No | None |
| Time-out waiting for response to TCP/IP connect() request. (Low-level timeout) | No | None |
| Time-out waiting for acceptance of a TCP/IP message over the network. (Low-level timeout) | No | None |
| Time-out for waiting for data between TCP/IP packets. (Low-level timeout) | No | None |
| Any changes to default TCP/IP settings, such as configurable stack parameters. | No | None |
| AE Specific Parameters (all AE's) | | |
| Size constraint in maximum object size | No | None |
| Maximum PDU size the AE can send | No | Unlimited |
| AE specific DIMSE level time-out values | No | None |
| Transfer Syntax support | No | All proposed |
| Other parameters that are configurable | No | None |

# 4 Support of Extended Character Sets

The application supports only ISO_IR 100 (ISO 8859-1 Latin 1) as extended character set.

# 5 Security

It is assumed that FDP is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to FDP.
- Firewall or router protections to ensure that FDP only has network access to approved external hosts.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN)).

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

## 5.1 Security Profiles

None supported.

## 5.2 Association Level Security

None supported.

## 5.3 Application Leve Security

None supported.