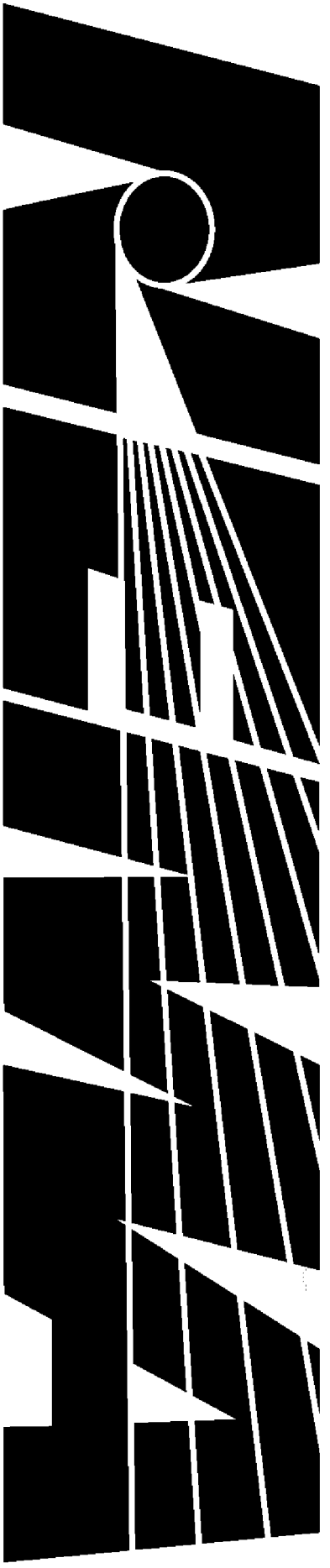
DICOM

Part 11

Media Storage Application Profiles



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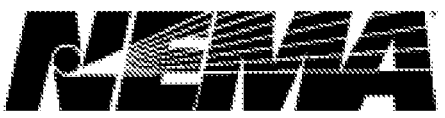

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Digital Imaging and Communications in Medicine (DICOM)

Part 11: Media Storage Application Profiles

Published by

National Electrical Manufacturers Association
1300 N. 17th Street
Rosslyn, Virginia 22209 USA

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- Standard -

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FOREWORD

The American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA) formed a joint committee to develop a Standard for Digital Imaging and Communications in Medicine. The ACC (American College of Cardiology) joined this standardization effort with a particular interest in the definition of Digital Media Storage Standards. This DICOM Standard was developed according to NEMA procedures.

This standard is developed in liaison with other standard organizations including CEN TC251 in Europe and JIRA in Japan, with review also by other organizations including IEEE, HL7 and ANSI in the USA.

The DICOM Standard is structured as a multi-part document using the guidelines established in the following document:

ISO/IEC Directives, 1989 part 3 - Drafting and Presentation of International Standards.

This document is part of the DICOM Standard which consists of the following parts:

PS 3.1: Introduction and Overview
PS 3.2: Conformance
PS 3.3: Information Object Definitions
PS 3.4: Service Class Specifications
PS 3.5: Data Structures and Encoding
PS 3.6: Data Dictionary
PS 3.7: Message Exchange
PS 3.8: Network Communication Support for Message Exchange
PS 3.9: Point-to-Point Communication Support for Message Exchange
PS 3.10: Media Storage and File Formats for Media Interchange
PS 3.11: Media Storage Application Profiles
PS 3.12: Media Formats and Physical Media for Media Interchange
PS 3.13: Print Management Point-to-Point Communication Support
PS 3.14: Grayscale Standard Display Function
PS 3.15: Security Profiles
PS 3.16: Content Mapping Resource

These parts are independent but related documents. Their development level and approval status may differ.

PS 3.7, PS 3.8, and PS 3.9 focus on the communication of digital image data across point-to-point and network interfaces. PS 3.10, PS 3.11, and PS 3.12 address the open interchange of digital image data on removable storage media. Their development takes into account past and current related efforts:

- The ACR-NEMA Standard for Magnetic Tape (PS1) has defined a generic means to store on a 9 track magnetic tape one or more Data Sets formatted per the ACR-NEMA V2.0 Standard
- A Japanese effort called IS&C (Image Save and Carry) has also used an ACR-NEMA V2.0-based format to store images on a 130 millimeter (5 1/4 inch) Magneto-Optical Disk with an IS&C specific media organization format
- European effort initiated by the University of Geneva in Switzerland has defined PAPYRUS, an ACR-NEMA V2.0-based format to store one or more images grouped as folders in files

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irrespective of the physical media and its file organization format. The new PAPYRUS V3.0 is intended to be a specific Application Profile compatible with this part

As both network communication and media interchange share a number of common characteristics, the following parts of DICOM developed for network communication are leveraged for media interchange:

PS 3.2: Conformance
PS 3.3: Information Object Definitions
PS 3.4: Service Class Specifications
PS 3.5: Data Set Structures and Encoding
PS 3.6: Data Dictionary

PS 3.10, *Media Storage and File Formats for Media Interchange*, lays a foundation for two other parts of the DICOM Standard by specifying a general model for the storage of medical imaging information on removable media. PS 3.12, *Media Formats and Physical Media,* defines a number of standard Physical Media and corresponding Media Formats suitable for medical image information exchange. This part, PS 3.11, *Media Storage Application Profiles,* enables interoperability by specifying standard sets of elements from the various other parts of the DICOM Standard related to a specific clinical need. Conformance to DICOM in the area of media interchange is defined by PS 3.2 and is based on the Application Profiles defined by this part.

PS 3.11 and PS 3.12 will be expanded through the addition of Application Profile and media definition annexes as clinical needs and physical media technologies evolve.

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1 Scope and field of application

This part of the DICOM Standard specifies application specific subsets of the DICOM Standard to which an implementation may claim conformance. Such a conformance statement applies to the interoperable interchange of medical images and related information on storage media for specific clinical uses. It follows the framework, defined in PS 3.10, for the interchange of various types of information on storage media.

This part is related to other parts of the DICOM Standard in that:

- PS 3.2, *Conformance*, specifies the general rules for assuring interoperability, which are applied for media interchange through the Application Profiles of this part
- PS 3.3, *Information Object Definitions*, specifies a number of Information Object Definitions (e.g., various types of images) which may be used in conjunction with this part. It also defines a medical Directory structure to facilitate access to the objects stored on media
- PS 3.4, *Service Class Specifications*, specifies the Media Storage Service Class upon which Application Profiles are built
- PS 3.5, *Data Structure and Encoding*, addresses the encoding rules necessary to construct a Data Set which is encapsulated in a file as specified in PS 3.10
- PS 3.6, Data Dictionary, contains an index by Tag of all Data Elements related to the Attributes of Information Objects defined in PS3.3. This index includes the Value Representation and Value Multiplicity for each Data Element
- PS 3.10, Media Storage and File Formats for Media Interchange, standardizes the overall open Storage Media architecture used by this part, including the definition of a generic File Format, a Basic File Service and a Directory concept
- PS 3.12, Media Formats and Physical Media, defines a number of standard Physical Media and corresponding Media Formats. These Media Formats and Physical Media selections are referenced by one or more of the Application Profiles of this part. PS 3.12 is intended to be extended as the technologies related to Physical Medium evolve
- PS 3.15, Security Profiles defines a number of profiles for use with Secure DICOM Media Storage Application Profiles. The Media Storage Security Profiles specify the cryptographic techniques to be used for each Secure DICOM File in a Secure Media Storage Application Profile.

2 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibilities of applying the most recent editions of the standards indicated below.

ISO/IEC Directives, 1989 part 3 - Drafting and presentation of international standards.

ISO 7498-1, Information Processing Systems - Open Systems Interconnection - Basic Reference Model.

ISO 7498-2, Information processing systems - Open Systems Interconnection - Basic reference Model - Part 2: Security Architecture

ISO 8859, Information Processing - 8-bit single-byte coded graphic character sets - part 1: Latin Alphabet No. 1.

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RFC-2630, Cryptographic Message Syntax, June 1999

3 Definitions

For the purposes of this standard the following definitions apply.

3.1 REFERENCE MODEL DEFINITIONS

This part of the Standard is based on the concepts developed in ISO 7498-1 and makes use of the following terms defined in it:

a) Application Entity
b) Service or Layer Service
c) Transfer Syntax

This Part of the Standard makes use of the following terms defined in ISO 7498-2:

a. Data Confidentiality

Note: The definition is "the property that information is not made available or disclosed to unauthorized individuals, entities or processes."

b. Data Origin Authentication

Note: The definition is "the corroboration that the source of data received is as claimed."

c. Data Integrity

Note: The definition is "the property that data has not been altered or destroyed in an unauthorized manner."

d. Key Management

Note: The definition is "the generation, storage, distribution, deletion, archiving and application of keys in accordance with a security policy."

3.2 DICOM INTRODUCTION AND OVERVIEW DEFINITIONS

This part of the Standard makes use of the following terms defined in PS 3.1 of the DICOM Standard:

- Attribute

3.3 DICOM CONFORMANCE

This part of the Standard makes use of the following terms defined in PS 3.2 of the DICOM Standard:

a) Conformance Statement
b) Standard SOP Class
c) Standard Extended SOP Class

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E.2.1.1 File Set Creator

The Application entity acting as a File-Set Creator generates a File Set under a STD-CTMR Application Profile. Typical entities using this role would include CT or MR equipment, and archive systems which generate a patient record for transfer to another institution. File Set Creators shall be able to generate the Basic Directory SOP Class in the DICOMDIR File with all types of Directory Records related to the SOP Classes stored in the File-set.

An FSC shall offer the ability to either finalize the disc at the completion of the most recent write session (no additional information can be subsequently added to the disc) or to allow multi-session (additional information may be subsequently added to the disc) or to allow packet-writing, if supported by the media and file system specified in the profile.

Note: A multiple volume (a logical volume that can cross multiple physical media) is not supported by this class of Application profile. If a set of Files, e.g., a Study, cannot be written entirely on one physical volume, the FSC will create multiple independent DICOM File-sets such that each File-set can reside on a single physical volume controlled by its individual DICOMDIR file. The user of the FSC can opt to use written labels on the physical volumes to indicate that there is more than one physical volume for this set of files (e.g., a study).

E.2.1.2 File Set Reader

The role of File Set Reader is used by Application Entities which receive a transferred File Set. Typical entities using this role would include display workstations, and archive systems which receive a patient record transferred from another institution. File Set Readers shall be able to read all the SOP Classes defined for the specific Application Profile for which a Conformance Statement is made, using all the defined Transfer Syntaxes.

E.2.1.3 File Set Updater

The role of File Set Updater is used by Application Entities which receive a transferred File Set and update it by the addition of information. Typical entities using this role would include analytic workstations, which, for instance, may add to the File-set an information object containing a processed image. Stations which update patient information objects would also use this role. File-set Updaters do not have to read the images. File-set Updaters shall be able to generate one or more of the SOP Instances defined for the specific Application Profile for which a conformance statement is made, and to read and update the DICOMDIR file.

An FSU shall offer the ability to either finalize the disc at the completion of the most recent write session (no additional information can be subsequently added to the disc) or to allow multi-session (additional information may be subsequently added to the disc) or to allow packet-writing if supported by the media and file system specified in the profile.

Note: If the volume has not been finalized, the File Set Updater will be able to update information assuming there is enough space on the volume to write a new DICOMDIR file, the information, and the fundamental volume control structures. Volume control structures are the structures that are inherent to the standards of the physical volume, see PS 3.12.

E.3 STD-CTMR PROFILES

E.3.1 SOP Classes and Transfer Syntaxes

These Application Profiles are based on the Media Storage Service Class with the Interchange Option (see PS 3.4).

SOP Classes and corresponding Transfer Syntaxes supported by these Application Profiles are specified in the Table E.3-1.

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Table E.3-1
STD-CTMR SOP Classes and Transfer Syntaxes

Information Object Definition	Service Object Pair Class UID	Transfer Syntax and UID	FSC Require-ment	FSR Require-ment	FSU Require-ment
Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Mandatory	Mandatory	Mandatory
CT Image	1.2.840.10008.5.1.4.1.1.2	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	Optional	Mandatory	Optional
CT Image	1.2.840.10008.5.1.4.1.1.2	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Optional	Mandatory	Optional
MR Image	1.2.840.10008.5.1.4.1.1.4	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	Optional	Mandatory	Optional
MR Image	1.2.840.10008.5.1.4.1.1.4	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Optional	Mandatory	Optional
SC Image (grayscale)	1.2.840.10008.5.1.4.1.1.7	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	Optional	Mandatory	Optional
SC Image (grayscale)	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Optional	Mandatory	Optional
SC Image (palette color)	1.2.840.10008.5.1.4.1.1.7	JPEG Lossless Process 14 (selection value 1) 1.2.840.10008.1.2.4.70	Optional	Optional	Optional
SC Image (palette color)	1.2.840.10008.5.1.4.1.1.7	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Optional	Optional	Optional
Detached Patient Management	1.2.840.10008.3.1.2.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Optional	Defined in Conformance Statement (See E.3.4.1.1)	Optional

E.3.2 Physical Medium And Medium Format

The STD-CTMR-MOD650 application profile requires the 130 mm 650MB R/W MOD physical medium with the PCDOS Media Format, as defined in PS 3.12.

The STD-CTMR-MOD12 application profile requires the 130 mm 1.2GB R/W MOD physical medium with the PCDOS Media Format, as defined in PS 3.12.

The STD-CTMR-MOD23 application profile requires the 130 mm 2.3GB R/W MOD physical medium with the PCDOS Media Format, as defined in PS 3.12.

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The STD-CTMR-CD application profile requires the 120 mm CD-R physical medium with the ISO 9660 Media Format, as defined in PS 3.12.

The STD-CTMR-DVD-RAM application profile requires the 120 mm DVD-RAM medium, as defined in PS 3.12.

E.3.3 Directory Information in DICOMDIR

Conformant Application Entities shall include in the DICOMDIR File a Basic Directory IOD containing Directory Records at the Patient and subsidiary levels appropriate to the SOP Classes in the File-set. All DICOM files in the File-set incorporating SOP Instances defined for the specific Application Profile shall be referenced by Directory Records.

Note: DICOMDIRs with no directory information are not allowed by this Application Profile.

E.3.3.1 Additional Keys

File Set Creators and Updaters are required to generate the mandatory elements specified in PS 3.3, Annex F of the standard. Table E.3-2 specifies the additional associated keys. At each directory record level other additional data elements can be added, but it is not required that File Set Readers be able to use them as keys. Refer to the Basic Directory IOD in PS 3.3.

E.3.3.2 Localizer Related Attributes

Directory Records of type IMAGE shall include the mandatory attributes from the Frame of Reference and Image Plane modules, if present in the composite image object, as specified in PS3.3 and included in Table E.3-2, in order to allow the image to be referenced to a localizer image or other orthogonal image. The Rows (0028,0010) and Columns (0028,0011) attributes are required in order to facilitate annotation of such a localizer.

Note: The Frame of Reference module is specified in PS 3.3 as mandatory for the CT and MR composite information objects, but not for Secondary Capture objects.

E.3.3.3 Icon Images

Directory Records of type SERIES or IMAGE may include Icon Images. The icon pixel data shall be as specified in PS 3.3 Icon Image Key Definition, and restricted such that Photometric Interpretation (0028,0004) shall be MONOCHROME2 or PALETTE COLOR, Bits Allocated (0028,0100) and Bits Stored (0028,0101) shall be equal to 8, and Rows (0028,0010) and Columns (0028,0011) shall be equal to 64.

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E.3.4 Other Parameters

This section defines other parameters in the STD-CTMR profiles which need to be specified in order to ensure interoperable information interchange.

Table E.3-2
STD-CTMR Additional DICOMDIR Keys

Key Attribute	Tag	Record Type	Type	Notes
Referenced Image Sequence	(0008,1140)	IMAGE	1C	Required if present in image object.
>Referenced SOP Class UID	(0008,1150)	IMAGE	1C	Required if Referenced Image Sequence (0008,1140) is present.
>Referenced SOP Instance UID	(0008,1155)	IMAGE	1C	Required if Referenced Image Sequence (0008,1140) is present.
Image Position (Patient)	(0020,0032)	IMAGE	1C	Required if present in image object.
Image Orientation (Patient)	(0020,0037)	IMAGE	1C	Required if present in image object.
Frame of Reference UID	(0020,0052)	IMAGE	1C	Required if present in image object.
Rows	(0028,0010)	IMAGE	1	
Columns	(0028,0011)	IMAGE	1	
Pixel Spacing	(0028,0030)	IMAGE	1C	Required if present in image object.

Notes: 1. The Basic Directory Information Object definition in PS 3.3 defines the following attributes as Type 1 or 2: for PATIENT directory records: (0010,0010) Patient's Name; for STUDY directory records: (0008,0050) Accession Number, (0008,0020) Study Date, (0008,1030) Study Description; for SERIES directory records: (0008,0060) Modality. Hence these are not redefined here.

2. The Basic Directory Information Object definition in PS 3.3 allows for the optional inclusion of Icon Images at the IMAGE or SERIES level. These remain optional for this profile, and the choice of whether or not to include Icon Images for every image or series, or in a more selective manner, is left up to the implementor. E.3.3.3 describes restrictions that apply to Icon Images that are included in this profile.

E.3.4.1 Image Attribute Values

The attributes listed in Table E.3-3 used within CT Image files, those listed in Table E.3-4 used within MR Image files, those listed in Table E.3-5 used within grayscale SC Image files, and those listed in Table E.3-6 used within color SC Image files, shall take the values specified, which are more specific than, but must be consistent with, those specified in the definition of the CT, MR and SC Image Information Object Definitions in PS 3.3.

Table E.3-3 STD-CTMR
Required Image Attribute Values for CT Images

Attribute	Tag	Value
Modality	(0008,0060)	CT
Photometric Interpretation	(0028,0004)	MONOCHROME2

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Table E.3-4 STD-CTMR
Required Image Attribute Values for MR Images

Attribute	Tag	Value
Modality	(0008,0060)	MR
Photometric Interpretation	(0028,0004)	MONOCHROME2
Bits Stored	(0028,0101)	8,12 to 16
High Bit	(0028,0102)	(0028,0101) Bits Stored - 1

Note: The definition of the MR Composite Image Object in PS 3.3 does not restrict (0028,0101) Bits Stored or (0028,0102) High Bit.

Table E.3-5 STD-CTMR
Required Image Attribute Values for Grayscale SC Images

Attribute	Tag	Value
Samples Per Pixel	(0028,0002)	1
Photometric Interpretation	(0028,0004)	MONOCHROME2
Bits Allocated	(0028,0100)	8 or 16
Bits Stored	(0028,0101)	(0028,0100) Bits Allocated
High Bit	(0028,0102)	(0028,0101) Bits Stored - 1

Table E.3-6 STD-CTMR
Required Image Attribute Values for Color SC Images

Attribute	Tag	Value
Samples Per Pixel	(0028,0002)	1
Photometric Interpretation	(0028,0004)	PALETTE COLOR
Bits Allocated	(0028,0100)	8
Bits Stored	(0028,0101)	8
High Bit	(0028,0102)	7

E.3.4.1.1 Attribute Value Precedence

If an FSR supports the Detached Patient Management SOP Class, the values of attributes contained in a Detached Patient Management SOP Instance referenced by a Directory Record of type PATIENT, shall take precedence over the values of those attributes contained in the SOP Instance referenced by a subsidiary Directory Record. The DICOMDIR Directory Records of type PATIENT shall have key attributes values in accordance with this precedence.

Note: 1. This allows patient identification and demographic information to be updated without changing the composite Image IOD files. The DICOMDIR file thus is critical in establishing the link between the updated information and the image. As an example, at the time an Image file was written, the patient's name therein was incorrect, or inconsistent with the Hospital Informations System records. Subsequently, a Detached Patient Management file with the corrected name is added to the File Set. The FSR should use the information from the Detached Patient Management SOP Class, rather than the information in the Image file.

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2. The support for the Detached Patient Management SOP Class as indicated in Table E.3-1, is to be defined in the Conformance Statement, and is not mandatory for all FSRs of this profile. Applications which require the ability to read updated patient identifying information, such as an FSR that may forward an updated SOP Instance elsewhere, may need to support this mechanism. Applications such as standalone viewers may choose not to support this mechanism, in which case the user should be made aware, for example by a screen message or in the documentation, that updated identifying information may exist on the media that is not visible.

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Annex F (Normative) - Waveform Diskette Interchange Profile

F.1 PROFILE IDENTIFICATION

This Annex defines a class of Application Profiles for interchange of Waveform SOP Instances via 1.44 MB Diskette (floppy disk) media.

The identifier for this class shall be STD-WVFM.

The specific Application Profiles in this class are shown in the Table F.1.

Table F.1 - Waveform Application Profiles

Application Profile	Identifier	Description
12-lead ECG Interchange on Diskette	STD-WVFM-ECG-FD	Uncompressed ECG waveform data
Hemodynamic Waveform Interchange on Diskette	STD-WVFM-HD-FD	Uncompressed hemodynamic waveform data

F.2 CLINICAL CONTEXT

This Application Profile facilitates the interchange of waveforms and related data on floppy disk media.

This primary clinical context for this profile is the transfer of waveforms, such as electrocardiograms, from non-networked equipment (mobile or remote acquisition units) to archive or display equipment.

F.2.1 Roles and Service Class Options

This class of Application Profile uses the Media Storage Service Class defined in PS3.4 with the Interchange Option.

The Application Entity shall support one or more of the roles of File Set Creator (FSC), File Set Reader (FSR), and File Set Updater (FSU), defined in PS 3.10.

The role of File Set Creator shall be used by Application Entities which generate a File Set under this Class of Application Profiles. FSCs shall be able to generate the Waveform SOP Instances defined for this Application Profile, and the Basic Directory SOP Instance in the DICOMDIR file with all the subsidiary Directory Records related to the Waveform SOP Instances stored in the File Set.

The role of File Set Reader shall be used by Application Entities which receive a transferred File Set under this Class of Application Profiles. File Set Readers shall be able to read the DICOMDIR directory file and all the SOP Instance files defined for this Application Profile, using the defined Transfer Syntax.

The role of File Set Updater is used by Application Entities which receive a transferred File Set under this Class of Application Profiles, and update it by the addition (or deletion) of waveforms or ancillary information to (or from) the medium. FSUs shall be able to read and update the DICOMDIR file, and optionally to generate the Waveform SOP Instances defined for this Application Profile.

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F.4 STD-WVFM-ECG-FD PROFILE

F.4.1 SOP Classes and Transfer Syntaxes

This Application Profile is based on the Media Storage Service Class with the Interchange Option (see PS 3.4).

The SOP Classes and corresponding Transfer Syntax supported by this Application Profile are specified in the Table F.4.1-1. The supported Storage SOP Classes shall be listed in the Conformance Statement using a table of the same form.

Table F.4.1-1 STD-WVFM-ECG-FD SOP Classes and Transfer Syntaxes

Information Object Definition	Service Object Pair Class UID	Transfer Syntax and UID	FSC Require-ment	FSR Require-ment	FSU Require-ment
Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Mandatory	Mandatory	Mandatory
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Mandatory	Mandatory	Optional

F.4.2 Physical Medium And Medium Format

The STD-WVFM-ECG-FD application profile requires the 1.44 MB Diskette physical medium with the PC File System Media Format, as defined in PS3.12 Annex B.

F.4.3 Directory Information in DICOMDIR

Conformant Application Entities shall include in the DICOMDIR File the Basic Directory IOD containing Directory Records at the Patient and the subsidiary Study and Series levels, appropriate to the SOP Classes in the File Set. All DICOM files in the File Set incorporating SOP Instances defined for the specific Application Profile shall be referenced by Directory Records.

F.5 STD-WVFM-HD-FD PROFILE

F.5.1 SOP Classes and Transfer Syntaxes

This Application Profile is based on the Media Storage Service Class with the Interchange Option (see PS 3.4).

The SOP Classes and corresponding Transfer Syntax supported by this Application Profile are specified in the Table F.5.1-1. The supported Storage SOP Classes shall be listed in the Conformance Statement using a table of the same form.

Table F.5.1-1 STD-WVFM-HD-FD SOP Classes and Transfer Syntaxes

Information Object Definition	Service Object Pair Class UID	Transfer Syntax and UID	FSC Require-ment	FSR Require-ment	FSU Require-ment
Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Mandatory	Mandatory	Mandatory

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Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Mandatory	Mandatory	Optional

F.5.2 Physical Medium And Medium Format

The STD-WVFM-HD-FD application profile requires the 1.44 MB Diskette physical medium with the PC File System Media Format, as defined in PS3.12 Annex B.

F.5.3 Directory Information in DICOMDIR

Conformant Application Entities shall include in the DICOMDIR File the Basic Directory IOD containing Directory Records at the Patient and the subsidiary Study and Series levels, appropriate to the SOP Classes in the File Set. All DICOM files in the File Set incorporating SOP Instances defined for the specific Application Profile shall be referenced by Directory Records.

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Annex G Index of Attribute Tags and UIDs (Informative)

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(0008,0020)	29, 35
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(0008,0060)	13, 18, 35, 36
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(0008,0081)	12, 17
(0008,1030)	35
(0008,1050)	12, 17
(0008,1140)	12, 17, 29, 35
(0008,1150)	12, 17, 29, 35
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(0028,0004)	17, 18, 34, 35, 36
(0028,0010)	12, 13, 17, 18, 34, 35
(0028,0011)	12, 13, 17, 18, 34, 35
(0028,0030)	35
(0028,0100)	12, 13, 18, 34, 36
(0028,0101)	13, 17, 18, 34, 36
(0028,0102)	18, 36
(0028,0103)	18
(0028,6010)	12, 17
(0050,0004)	12, 17
(0088,0200)	12, 17
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