2

4

6

8

**Digital Imaging and Communications in Medicine (DICOM)**

10 *Supplement 19 General Purpose CD-R Image Interchange Profile*

12

14

16

18

20

22

24

26

VERSION: **Final Text - January 28, 1997**

# Table of Contents

**Digital Imaging and Communications in Medicine (DICOM)**

*PART 11 Addendum: General Purpose CD-R Image Interchange Profile*

## Annex X (Normative) - General Purpose CD-R Image Interchange Profile

X.1 PROFILE IDENTIFICATION

This Annex defines an Application Profile Class potentially inclusive of all defined Media Storage SOP Classes. This class is intended to be used for the interchange of Composite Image and Standalone SOP Instances via CD-R media for general purpose applications.Objects from multiple  modalities may be included on the same media.

A detailed list of the Media Storage SOP Classes that may be supported is defined in PS 3.4.

**Table X.1-1 STD-GEN-CD Profile**

| Application Profile | Identifier | Description |
|---|---|---|
| General Purpose CD-R Image Interchange | STD-GEN-CD | Handles interchange of Composite Image SOP Instances and SOP Instances which conform to the model defined for Stand-alone SOP Classes, such as Curves, Overlays and LUTs. |

The identifier for this General Purpose Image Exchange profile shall be STD-GEN-CD.

Equipment claiming conformance to this Application Profile shall list the subset of Media Storage SOP Classes that it supports in its Conformance Statement.

Note:    Since it is not required to support all Media Storage Classes the user should carefully consider the subset of supported Media Storage SOP Classes in the Conformance Statements of such equipment to establish effective object interchange.

X.2 CLINICAL CONTEXT

This Application Profile facilitates the interchange of images and  related data on CD-R media. Typical interchange would be between acquisition devices, archives and workstations.

This Application Profile facilitates the creation of a multi-modality medium for image interchange, useful for clinical, patient record, teaching and research applications, within and between institutions.

This profile is intended only for general purpose applications. It is not intended as a replacement for specific Application Profiles that may be defined for a particular clinical context. The latter may support compression transfer syntaxes, limitations on the form and content of SOP Class instances, and specific media choices that preclude the use of the General Purpose Interchange Profile.

Note:    The creation of a CD-R is considerably more complex than the reading thereof. Therefore the clinical context for this Application profile is likely to be asymmetric, with a sophisticated File Set Creator and relatively simple File Set Readers.

**X.2.1 Roles and Service Class Options**

This 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.

## X.2.1.1 File Set Creator

The role of File Set Creator shall be used by Application Entities which generate a File Set under this Image Interchange Class of Application Profiles.

File Set Creators shall be able to generate the Basic Directory SOP Class in the DICOMDIR file with all the subsidiary Directory Records related to the Image SOP Classes stored in the File Set.
The Application Entity acting as a File Set Creator generates a File Set under the STD-GEN-CD Application Profile.

FSC shall offer the ability to either finalize the physical volume at the completion of the most recent write session (no additional information can be subsequently added to the volume) or to allow multi-session (additional information may be subsequently added to the volume).

> Note:    A multiple volume (i.e. 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).

## X.2.1.2 File Set Reader

The role of File Set Reader shall be used by Application Entities which receive a transferred File Set under the Image Interchange Class of Application Profiles. Typical entities using this role would include image generating systems, display workstations, and archive systems which receive a patient record; e.g. transferred from another institution.

File Set Readers shall be able to read the DICOMDIR directory file and all the SOP Instance files defined for this Application Profile, for which a Conformance Statement is made, using the defined Transfer Syntax.

## X.2.1.3 File Set Updater

The role of File Set Updater is used by Application Entities which receive a transferred File Set under the Image Exchange Class of Application Profiles and update it by the addition (or deletion) of images  or information to (or from) the medium. Typical entities using this role would include image generating systems and workstations which process or modify images.

File Set Updaters shall be able to generate one or more of the SOP Instances defined for this Application Profile, for which a Conformance Statement is made, and to read and update the DICOMDIR file.

FSU shall offer the ability to either finalize the physical volume at the completion of the most recent write session (no additional information can be subsequently added to the volume) or to allow multi-session (additional information may be subsequently added to the volume).

> 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.

X.3 STD-GEN-CD PROFILE

### X.3.1 SOP Classes and Transfer Syntaxes

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

**Table X.3.1-1 STD-GEN-CD SOP Classes and Transfer Syntaxes**

| Information Object Definition | Service Object Pair Class UID | Transfer Syntax and UID | FSC Requirement | FSR Requirement | FSU Requirement |
|---|---|---|---|---|---|
| Basic Directory | 1.2.840.10008. 1.3.10 | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 | Mandatory | Mandatory | Mandatory |
| Composite Image & Stand-alone Storage | *Refer to: PS 3.4 for SOPs UID definitions* | Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1 | Defined in Conformance Statement | Defined in Conformance Statement | 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 X.3.3.2) | Optional |

The SOP Classes and corresponding Transfer Syntax supported by this Application Profile are specified in the Table X.3.1-1. The supported Storage SOP Class(es) shall be listed in the Conformance Statement using a table of the same form.

### X.3.2 Physical Medium And Medium Format

The STD-GEN-CD application profile requires the 120 mm CD-R physical medium with the ISO/IEC 9660 Media Format, as defined in PS3.12.

### X.3.3 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.

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

All implementations shall include the DICOM Media Storage Directory in the DICOMDIR file. There shall only  be one DICOMDIR file per File Set. The DICOMDIR file shall be in the root directory of the medium. The Patient ID at the patient level shall be unique for each patient directory record in one File Set.

## X.3.3.1 Additional Keys

File Set Creators and Updaters are required to generate the mandatory elements specified in PS  3.3.

Table X.3.3.1-1 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.

**Table X.3.3.1-1 STD-GEN-CD Additional DICOMDIR Keys**

| Key Attribute | Tag | Directory Record Type | Type | Notes |
|---|---|---|---|---|
| Image Type | (0008,0008) | IMAGE | 1C | Required if present in image object. |
| 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. |

Note:    The requirements with respect to the mandatory DICOMDIR keys in PS 3.3 imply that either these attributes are present in the Image IOD, or they are in some other way supplied by the File-set Creator. These attributes are (0010,0020) Patient ID, (0008,0020) Study Date, (0008,0030) Study Time, (0020,0010) Study ID, (0020,0011) Series Number, and (0020,0013) Image Number.

## X.3.3.2 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.

2. The support for the Detached Patient Management SOP Class as indicated in Table X.3.1-1, 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.