IEC TR 63475

Edition 1.0   2023-11

TECHNICAL
REPORT

Overwiew of Universal Archival Disk Format (UADF)

IEC TR 63475:2023-11(en)

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC TR 63475

Edition 1.0 2023-11

TECHNICAL REPORT

Overwiew of Universal Archival Disk Format (UADF)

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

OVERVIEW OF UNIVERSAL ARCHIVE DISK FORMAT (UADF)

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63475 has been prepared by technical area 6: Storage media, storage data structures, storage systems and equipment, of IEC technical committee TC 100: Audio, video and multimedia systems and equipment. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
100/4030/DTR	100/4065/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,

- withdrawn, or

- revised.

iTeh Standards
(https://standards.iteh.ai)
Document Preview

IEC TR 63475:2023
https://standards.iteh.ai/catalog/standards/sist/9d541a4c-c7e1-45e3-b716-254807fddfb9/iec-tr-63475-2023

INTRODUCTION

To date, many kinds of storage media and storage devices for digital data storage have been used. For example, flexible disks, optical disks, magnetic tape cartridges, secure digital (SD) cards, flash drives, hard disk drives (HDD), solid-state drives (SSD). Each of them has different characteristics in terms of volatility, mutability, accessibility, and addressability, where different management methods for recorded data files and different systemization technologies are applied. However, it is not easy to manipulate the characteristics properly, especially in personal, home and small office environments. As a result, many files recorded on storage media in the past cannot be recovered due to media age, digital rights management (DRM), compatibility between PC and drive interfaces, drives and media, operation systems (OS) and file systems, applications and file formats, and so on, making storage media unusable. This situation will continue for future generations.

This document describes the significant perspectives to solve the problems of file system compatibility and also the age of the media and DRM by specifying a volume and file structure for interchanging files in a data archive system capable of preserving data for the long term.

OVERVIEW OF UNIVERSAL ARCHIVE DISK FORMAT (UADF)

1 Scope

This document describes a universal volume and file format for interchanging files on archive storages in personal computing and home entertainment environments.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
space
physically contiguous region

3.2
volume
physically or logically contiguous *space* (3.1) where the file system operates

3.3
physical volume
storage device (3.15) such as HDDs or SSDs, or *disks* (3.16) such as optical disks delivering a single *space* (3.1) or multiple *spaces*

Note 1 to entry: A single space is provided with no partitioning and plural spaces are provided with partitions, for example 128 in GUID partition table (GPT) format.

3.4
physical partition
contiguous *space* (3.1) created by partitioning a *physical volume* (3.3)

3.5
logical volume
logically contiguous region as a *volume* (3.2) consisting of *physical volumes* (3.3)

3.6
multi-volume
region consists of more than one *volume* (3.2)

3.7
operational volume
volume (3.2) assigned to a file system to work

3.8
container
mother *volume* (3.2) containing several logically distinguished contiguous regions as an *operational volume* (3.7), but sharing the mother *space* (3.1) to expand a logically contiguous region of the *operational volume* (3.7) on the fly until it reaches the maximum size defined in initial setting

3.9
expandable operational volume
logical volume (3.5) consisting of an initial physical region allocated and expanded on the fly with the addition of physically contiguous *segments* (3.10) in the mother *container* (3.8) until it reaches the maximum size that was initially set

3.10
segment
contiguous fixed size unit of a region for expanding an *expandable operational volume* (3.9)

3.11
long_ad
long allocation descriptor
16-byte data structure consisting of length and location fields of extent, which is a set of sectors or logical blocks, and an implementation use field

Note 1 to entry: The long_ad is intended for use when the extent's location may be on another partition (either on a given volume or another).

3.12
ISO file
single file that's a perfect representation of an entire CD, DVD, or BD

Note 1 to entry: The entire contents of a disk can be precisely duplicated in a single ISO file based on ISO 9660 or ISO/IEC 13346.

3.13
column-wise system file
system file for applying vertical division data of row table data

3.14
universal archive disk format
UADF
universal volume and file format for interchanging files on archive storages

3.15
storage device
functional unit into which data can be placed, in which they can be retained, and from which they can be retrieved storage

[SOURCE: ISO/IEC 2382-1:1993, 01.01.10]

3.16
disk
circular storage in which data are stored on the flat surfaces, in use, rotating around a spindle

4 Abbreviations

API	application programming interface
A/V	audio and visual
DRM	digital rights management
Exif	exchangeable image file format
GUI	graphical user interface
HDD	hard disk drive
ICT	information and communication technology
iVDR	information versatile disk for removable usage
LVM	logical volume manager
OS	operating system
PE	physical extent
QBE	query-by-example
RAID	redundant arrays of inexpensive disks
SD card	secure digital card
SSD	solid state drive
UADF	universal archive disk format
UDF	universal disk format
VG	volume group

5 Current situation for data recorded on media

There is a wide variety of storage media with the evolution of digital technology, and their management methods of recorded files are also diverse and inconsistent. Each storage medium has different characteristics, but most users don't have any knowledge about them, and even if they have it, it is not easy to manipulate the characteristics properly, especially for personal, home, and small offices. As a result, many of the files recorded on storage media in the past are presently difficult to restore. For example, it is difficult to retrieve files from old HDDs due to the age of the devices and the connectivity of their interface, and from floppy disks and SmartMedia due to the age of the media and devices and the compatibility of their file systems. Also, due to manufacturers' proprietary DRM that relies on individual devices, it is impossible to play video contents from HDDs connected to, for example, another TV.

It can be easily expected for this situation to continue in the future.

6 Data archive system

6.1 General

A data archive system includes the following features:

– all storage devices of various types that make up the data archive system are treated as one storage system and users don't need to consider data allocation on it;

– in order to have a flexible, powerful and robust data archive system, all created data, such as documents, photos, videos, and recorded television (TV) contents with digital rights management (DRM), are stored in an appropriate storage automatically and managed easily with minimized storage reallocation; all data stored in the lost storage devices are retrieved completely even if some of the storage devices that make up the data archive system are broken or missing; privacy and security of the data are protected from ransomware by using proper encryption technologies.