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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Multimedia systems and equipment – Multimedia e-publishing and e-books – Reader's format for e-publishing

Systèmes et appareils multimedia – Edition électronique multimedia et livres électroniques – Format du lecteur pour édition électronique

IEC 62524:2009

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MULTIMEDIA SYSTEMS AND EQUIPMENT – MULTIMEDIA E-PUBLISHING AND E-BOOKS – READER'S FORMAT FOR E-PUBLISHING

FOREWORD

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International Standard IEC 62524 has been prepared by technical area 10: Multimedia e-publishing and e-books, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This bilingual version, published in 2009-04, corresponds to the English version.

The text of this standard is based on the following documents:

CDV	Report on voting
100/1376/CDV	100/1487/RVC

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

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

Markets for multimedia e-book and e-publishing require standardization of formats for e-book data interchange among related parties: authors, data preparers, publishers and readers. The formats are classified into submission format, generic format and reader's format. The submission format has to support an interaction between authors and data preparers. The generic format has to provide an interchange format for data preparers and publishers and therefore should be reading-device-independent. The reader's format depends on e-publishing equipment.

MULTIMEDIA SYSTEMS AND EQUIPMENT – MULTIMEDIA E-PUBLISHING AND E-BOOKS – READER'S FORMAT FOR E-PUBLISHING

1 Scope

This International Standard specifies a reader's format for multimedia e-publishing employed for e-book data interchange among publishers and readers, satisfying a number of readers' requirements such as being non-revisable, equipment-adaptive and application-adaptive.

NOTE This International Standard does not address the following issues:

- elements necessary for final print reproduction only;
- rendering issues related to physical devices;
- metadata issues for document management;
- security issues such as DRM for document.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC/TS 62229:2006, *Multimedia systems and equipment – Multimedia e-publishing and e-book – Conceptual model for multimedia e-publishing*

3 Terms and definitions

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

3.1
data preparer
organization or person that prepares an e-book

NOTE An editor is an example of preparer.

3.2
multimedia e-book
multimedia content consisting of text, graphics, sound and/or video data

3.3
publisher
organization or person that issues and distributes an e-book

3.4
reader
the final user who reads the e-book

3.5
reader's format
format for multimedia e-book contents rendered and presented by reading device

3.6
reading device
equipment or program used to render and display e-books

4 Position and requirements for reader's format

4.1 Reader's format in contents creation/distribution model

The conceptual model for multimedia e-publishing (IEC 62229) defines a contents creation/distribution model shown in Figure 1.

Author <--(1)--> **Data preparer** <--(2)--> **Publisher** --(3)--> **Reader**

IEC 190/09

Figure 1 – Contents creation/distribution model

In the third step of the distribution chain, the publisher creates the final version of the document in the reader's format, based on data obtained from the generic format in the previous step, and finally distributes it to the reader. There can be several distinct reader's formats, adapted to the various reading devices and distribution schemes. Because of reading devices' potential limitations, some reader's format may lack support for certain features of the corresponding generic format. It is the publisher's role to determine how to convert an e-book to a less capable format.

4.2 Requirements for reader's format

The reader's format can satisfy the following requirements of readers:

a) non-revisable

As the reader's format is the final form of the document, which will be used only for viewing, there is little point in it being revisable. What matters most is that the file should be easy to process, even if this makes editing the data more difficult. Being revisable can even be considered a problem, since it makes the format needlessly complex.

b) equipment-adaptive, application-adaptive

The reader's format is directly processed while the reader browses the book. For that reason, to maximize the reader's comfort, the format should be specifically designed to match the capabilities of the device, in terms of CPU power, memory foot-print, display size, etc. For example, a format targeted at a device with weak processing abilities should, in order to keep the memory and CPU requirements low: (1) Use a light special purpose binary structure, rather than processing-intensive formats like XML, (2) store the pre-calculated position of the elements, rather than compute the layout on the fly... On the other hand, if the target reading device is a high end processing system like a PC, a format allowing for rich multimedia effects would be preferred, since it can easily be handled.

c) legibility

To achieve a sufficient level of reading comfort, it is important that the reader's format pays attention to legibility on the reading device. In that regard, the following implementation methods can be considered.

- Fixed page layout

  The format defines the document so that each page of the document may be rendered identically on any reading device. In this type of layout, it is common to record directly in the file the actual position of all displayable elements. Generally, as the publisher can specify precisely the final aspect, he will set the layout that is deemed to be the most comfortable for the reader. Consequently, complex designs can be achieved, as long as the display is as large as, or maybe larger, than the designer expected, making it possible to reach excellent levels of legibility. On the other hand, if the actual display is smaller than the one the document was designed for, it must be zoomed out,

possibly making some characters unreadable, or the reader has to scroll around the document, reducing the reading comfort.

- Flowing layout

  In this type of layout, the reading device dynamically determines, according to the screen size, where line breaks should be inserted, and compute the resulting position of the various elements. The final layout therefore depends on the screen size, font type, font size, etc. The reading device usually has a set of rules to handle word wrapping or hyphenation (ends of lines). Even though this layout model cannot achieve designs as sophisticated as fixed page layouts, it can guarantee that the text will remain clearly readable, whatever the screen size. It also usually gives more customization options to the reader, letting him set parameters as the font size or colour, making it more easily adaptable to individual readers' preferences. On the other hand, the publisher somewhat loses control over the final appearance of the document.

- Others

  Intermediate solutions also exist. For example, a format could specify what is essentially a fixed layout when the screen is large enough to display the defined layout at the current zoom level, but also allow, when zooming in, to change the layout (by collapsing the margins or changing the paragraphs size, for example), so that the characters can indeed be zoomed in, without making the page larger than the screen.

4.3 File format

A reader's format may have a specific data structure depending on the reading device. When rendering functionality is supported by reading devices, both logical structure and style specification are recommended for flexibility of presentation. When no rendering functionality is supported by reading devices, the reader's format should have a final form structure.

The format may also be adapted to the mode of distribution.

- Complete single download: A whole e-book is copied or downloaded at a time to the reading device. In that case, the e-book can usually be stored in a single file.
- Continuous download: Chunks are downloaded on demand, during the rendering. This is useful for device with readily available connectivity, but limited storage capacity. This may be achieved by splitting the document in several small files.

4.4 Features of the reader's format

4.4.1 General

The features of the reader's format may vastly vary with the targeted reading devices, depending on their capabilities. For this reason, while creating contents for a particular reading device, the publisher may have to omit some features, or, on the contrary, add others to compensate.

4.4.2 Types of displayable elements

Actual rendering capacities of the rendering device may vary, but reader's formats should at least support text and static images. In addition, animations made of a sequence of static images, sound, movies and other multimedia data may be supported too.

4.4.3 Layout and styling

Reader's format, as the final document, shall contain all the styling information needed for proper screen rendering. As stated in 4.2 c), there are mainly two types of layout: the fixed page layout, and the flowing layout. In each case, the way to specify the style may be quite different. When opting for a fixed page layout, the most common solution is to store the final position and style of each displayable element. On the other hand, formats with a flowing

layout will have settings such as line spacing, character spacing, indentation and margins, which will be used for computing the layout on the fly by the reading device.

4.4.4 Fonts

In most formats, it is possible to set various text properties, such as font, size, colour, bold or italic, etc.

Moreover, in the case of fixed layout, to ensure that the page is rendered as intended, the font itself may be embedded in the document. On the other hand, in the case of flowing layout, while it is common to use the fonts bundled with the system, font data can sometimes be embedded in the document to ensure that all the needed glyphs will be available at read-time.

4.4.5 E-book specific features

- Link jump

  Allows to jump to a predefine position within the document or to a web site, upon clicking on, or otherwise activating a certain part of the document.

- Effects

  Specifies special visual effects for certain parts of the document, like fade-in or wipe.

5 Conformance level

Generally, reader's formats are designed to closely match the reproduction capabilities of the reading devices. As reading devices can be quite diverse in reproduction capabilities, it is to be expected that the capabilities of each reader's formats differ accordingly. To ease communication and understanding between the various actors of the e-book publishing market, this International Standard establishes a 3-level classification, namely, minimum, medium and rich conformance levels, to help categorize the different reader's formats.

This International Standard requires that each format define such 3-tier classification in itself.

While this standard stipulates a very rudimentary capability for minimum conformance level, other details of the 3 levels are left to the description of each format to allow for diversity among different formats.

a) Minimum conformance level

   Targeted at devices with low reproduction capabilities.

   This standard requires that at least a line of text data be displayed for a viewer to satisfy minimum conformance level.

b) Medium conformance level

   Intermediate level between minimum and rich conformance levels.

c) Rich conformance level

   Targeted at devices with high reproduction capabilities.

Annex A
(normative)

C-XMDF reader's format

A.1 About compact XMDF

The present International Standard describes an e-book format targeted at mobile phones. Similarly to HTML, text is not divided into pages, but dynamically arranged according to the screen and font size. This type of layout will be called flowing layout.

Compact XMDF documents may be divided into several parts, for distribution or retail purposes.

A compact XMDF document is usually made of several flows. These data structures are meant to match a meaningful division of the document, such as chapters. Flows are displayed in the order specified in the content data. The viewer should do a page break when moving from a flow to the next one. The specific way a document is to be divided into flows is not specified, and is left to the document preparer's discretion. Chapters of a novel or articles of a newspaper are good examples of possible divisions. Note that it is perfectly acceptable not to organize the document in several flows, and store every thing in only one flow. There are two types of flows: formatted text flows, and image base cell flows. In this text, when the type of the flow is obvious from the context, or not relevant to the discussion at hand, they may be simply referred to as flows.

To meet both the requirements of ease of edition during the preparation phase, and ease of processing by the software viewer, there are two corresponding format, as described in Table A.1.

Table A.1 – File types

Type	Details
Generic format	Format used for creation and edition of the document. It is meant to be easy to modify with a text editor, and is based on XML and CSV files.
Reader's format	Format used for distribution purposes. It is designed to be easy to process by the viewer software, and is a binary format.

Both formats have equivalent semantics, and the generic format is to be translated to the reader's format prior to distribution, possibly using conversion software.

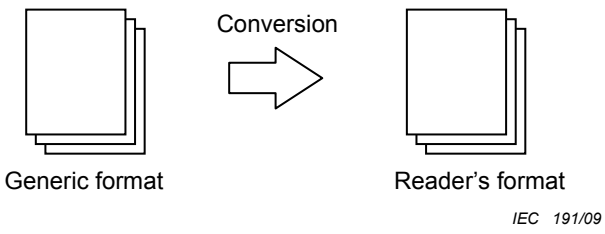

Figure A.1 – Relation between generic and reader's formats

This standard describes the binary reader's format.

A.2 Terms and definitions

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

A.2.1
checksum
sum one by one of all the bytes of the file (the checksum itself excluded) stored as a 4 byte field

A.2.2
cxmdf_char type
an integer ranging from 0 to 255, stored in one byte

A.2.3
cxmdf_int type
an integer ranging from 0 to 4 294 967 295, stored in four bytes in big-endian order

A.2.4
cxmdf_short type
an integer ranging from 0 to 65 535, stored in two bytes in big-endian order

A.2.5
cxmdf_Sshort type
an integer ranging from −32 768 to 32 767, stored in two bytes in big-endian order

A.2.6
cxmdf_string type
data type used to store character strings

See Table A.2 for details.

Table A.2 – Cxmdf_string type

Type/number of bytes	Content	Details
Cxmdf_char	Length of the string	Records the number of bytes used to store the string.
n	String	The number of bytes of this field is determined by the previous field. If 0, then this field does not exist. The string is to be interpreted according to the encoding specified in the character encoding flag of the root file (see A.4.1).

A.2.7
flow number
flows are numbered in order, starting at 0; the first flow is 0, the second is 1; the third is 2 and so on

A.2.8
half width and full width characters
characters called half width are the usual range of Latin characters, and similarly sized characters; full width characters, primarily used by CJK languages, are typically twice as large, even in mono space fonts

NOTE Most half width characters, including the space character, have a full width version, visually distinct, used for typographic purposes.

A.2.9
horizontal and vertical writing
text can be displayed in horizontal, left-to-right lines, beginning at the top of the page and going down, or in vertical top-to-bottom lines, beginning at the right of the page, and going left

NOTE The vertical mode is primarily used for CJK languages.

A.2.10
image number
images are numbered in their order of registration starting from 0, within the range specified in the root file as number of image data (see A.4.1)

A.2.11
in-line note character
in-line note characters are characters used to denote the reading, or pronunciation of other data or for other purposes (in-line notes)

NOTE Characters used in in-line notes are language and application dependent. This International Standard distinguishes in-line note characters from standard characters due to the possibility that the viewer needs special processing to handle in-line notes because of their character size, layout etc.

A.2.12
sound number
sounds are numbered in their order of registration starting from 0, within the range specified in the root file as number of sound data (see A.4.1)

A.2.13
standard character
standard characters are characters of the set specified in the root file (see A.4.1) with the standard character string flag

A.2.14
standard character string
strings made of standard characters

A.2.15
tag
basic unit of control information, used to carry the display settings to be applied to flows' text, such as paragraphs, font settings, pictures to be inserted, and so on

NOTE Tags are composed of a number identifying the feature they are related to, and parameters to give the setting's details.

A.2.16
unused region
region not used in this standard, which the C-XMDF viewer program is to ignore

A.3 File organization

A.3.1 Compact XMDF format

The compact XMDF format is made of several files. This clause introduces the different file types, and the naming conventions.

A.3.2 File types

Compact XMDF documents are made of files of types shown in Table A.3.