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**Information technology — MPEG  
systems technologies —**

**Part 14:  
Partial file format**

*Technologies de l'information — Technologies des systèmes MPEG —*

*Partie 14: Format de fichier partiel*

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## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)) or the IEC list of patent declarations received (see <http://patents.iec.ch>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

A list of all parts in the ISO 23001 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

The partial file format is designed to contain files partially received over a lossy link (with unreceived or corrupted sections), for further processing such as playback or repair. The file structure is object-oriented; a file can be decomposed into constituent objects very simply, and the structure of the objects inferred directly from their type. Files conforming to this format may be exchanged without losing information on losses, allowing redistribution (local gateways) or further repair processes.

The partial file format may be used to document reception of files, regardless of their bitstream format. For generic cases, it provides ways for file readers to resynchronize their parsing in case of byte losses. For cases where the documented file derives from ISO/IEC 14496-12, the partial file format provides additional tools, such as an index of the source file structures and data integrity information.

[Annex A](#) of this document defines the associated MIME type for files conformant to this document.

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# Information technology — MPEG systems technologies —

## Part 14: Partial file format

### 1 Scope

This document specifies the partial file format, which is a generic format for describing file partially received over lossy communication channels. This format contains the correctly received data, missing block identification, and repair information such as location of the file or high-level original indexing information. This format can be used with any file formats, and provides additional helper tools for formats deriving from ISO/IEC 14496-12.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO/IEC 14496-12, *Information technology — Coding of audio-visual objects — Part 12: ISO Base Media file format*

IETF RFC 5905, *Network Time Protocol Version 4: Protocol and Algorithms Specification*, Mills, D., et al, June 2010

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### 3 Terms, definitions, symbols, abbreviated terms and conventions

#### 3.1 Terms and definitions

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

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

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <http://www.electropedia.org/>

##### 3.1.1 chunk

addressable set of bytes of a partial segment

##### 3.1.2 indexed box

box in the *source file* (3.1.5) indexed by a `BoxIndexBox` in the *partial file* (3.1.3)

##### 3.1.3 partial file

name of the files conforming to the file format described in this document

##### 3.1.4 partial segment

portion of the *partial file* (3.1.3) containing a single `PartialSegmentBox` and identifying its associated source data

### 3.1.5

#### source file

file described and encapsulated by the *partial file* (3.1.3)

## 3.2 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

<b>MD5</b>	Message Digest 5
<b>FDT</b>	File Delivery Table
<b>FEC</b>	Forward Error Correction
<b>FLUTE</b>	File Delivery over Unidirectional Transport
<b>IANA</b>	Internet Assigned Numbers Authority
<b>IETF</b>	Internet Engineering Task Force
<b>RFC</b>	Request for Comments
<b>SHA</b>	Secure Hash Algorithm

## 4 Partial file organization

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### 4.1 Object structure

A partially received file, hereinafter referred to as *partial file*, is represented as a sequence of partial segments, preceded by a header. The header and the partial segments are formed as a series of objects, called boxes, as defined in ISO/IEC 14496-12; files under this document are object-structured files as defined in ISO/IEC 14496-12.

All object-structured files conformant to [Clause 4](#) shall contain a `FileTypeBox` as defined in ISO/IEC 14496-12. The `FileTypeBox` shall contain a compatible brand of type 'paff' for partial files, and of type 'pmff' for mixed partial files.

In this document, top-level boxes (boxes not contained in other boxes) are indicated as being at 'file' level, with the notation "Container: File".

The MIME type associated with a file conforming to this specification shall be formatted as defined in [Annex A](#).

### 4.2 Design consideration

#### 4.2.1 Features

The partial file format is intended to serve as a storage and exchange format for other file formats delivered over lossy channels. The format provides the following set of tools:

- Reception data, which provides means to store the received data and document transmission information such as received or lost byte ranges and whether the corrupted/lost bytes are present in the file.
- Repair information, such as location of the source file, possible byte offsets in that source, byte stream position at which a parser can try processing a corrupted file; depending on the communication channel, this information may be setup by the receiver or through out-of-band means.



- File format specific information, which depends on the type of file stored as a partial file; this document only defines additional tools for files based on ISO/IEC 14496-12.

**4.2.2 Data layout**

The partial file format is designed to allow continuous recording and storing of received data in a flexible way. A partial file is composed of a header providing information valid for the entire recording followed by any number of segments; all of these segments are described by partial segment structures and are hence called partial segments, although some can be correctly received. The header does not contain any data from the source file and contains only information that can usually be inferred from the parameters of the transmission, and hence does not require editing of the header values upon finalizing the recording. Each partial segment contains a variable number of received bytes from a given source, a map of valid byte ranges for these received bytes and optionally some repair information. Byte maps give offsets relative to the first byte of data in this partial segment, rather than from the first byte of data in the source file, in order to process partial segments without any knowledge of their position in the partial file. Each partial segment may describe correctly received data, lost data or a mix of correctly received and loss data.

**4.2.3 Box order**

An overall view of the normal encapsulation structure is provided in [Table 1](#). In the event of a conflict between this table and the prose, the prose prevails. The order of boxes within their container is not necessarily indicated in the table.

The table shows those boxes that may occur at the top-level in the left-most column; indentation is used to show possible containment. Not all boxes need to be used in all files; the mandatory boxes are marked with an asterisk (\*). See the description of the individual boxes for a discussion of assumptions if the optional boxes are not present.

Objects using an extended type may be placed in a wide variety of containers, not just the top level.

The following rules shall be followed for the order of boxes in a partial file:

- The `FileTypeBox` shall occur first in the file.
- The `PartialFileBox`, if present, shall occur immediately after the `FileTypeBox`.

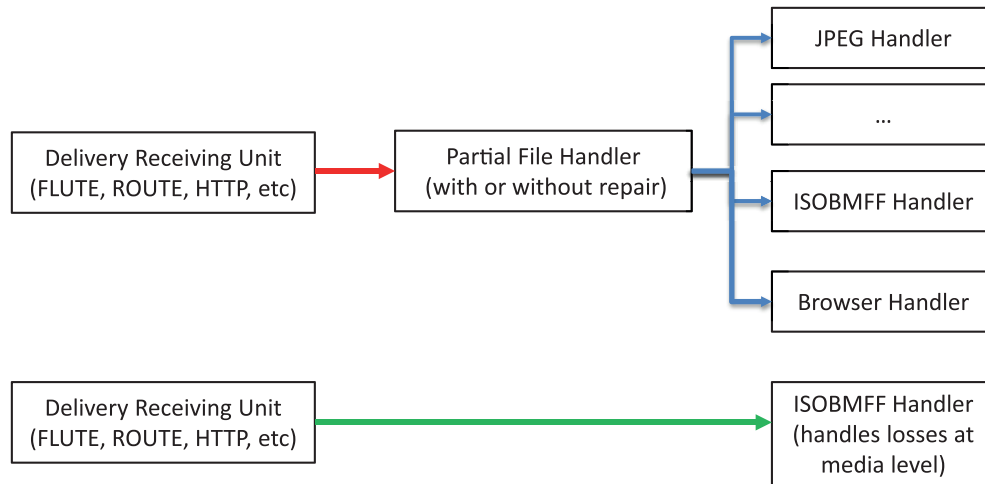
**Table 1 — Box types, structure and cross-reference**

Box types, structure and cross-reference						
ftyp					*	file type and compatibility
pfil					<a href="#">5.1.1</a>	container for metadata global to file
	pfhd				*	<a href="#">5.1.2</a> data about the entire partial file
	surl				<a href="#">5.1.8</a>	source URL and mime for the complete source file
	ptle				<a href="#">5.1.7</a>	entry points information for the complete source file
	fidx				<a href="#">5.2.2</a>	box file index for the complete source file
		bidx			<a href="#">5.2.3</a>	box index for a box of the source file
			dint		<a href="#">5.2.4</a>	data integrity container for the complete source file
				dihd	*	<a href="#">5.2.5</a> data integrity hash
				frpa	<a href="#">5.2.6</a>	front part (initial bytes) of an indexed box
	dref				<a href="#">5.1.1</a>	data reference box as defined in ISO/IEC 14496-12
pdat					<a href="#">5.1.2</a>	partial segment data
pseg					*	<a href="#">5.1.4</a> partial segment
<b>Key</b>						
* Boxes that are mandatory within their container, which itself can be mandatory or optional.						



#### 4.2.5 Processing model

The processing model of partial files or mixed partial files is illustrated in Figure 2. In partial file mode, there is a “partial file handler” that is used, which in turn delegates to the original file handler. In mixed partial mode, the original file handler can be extended to handle partial files with their own original MIME type.



**Figure 2 — Processing model of partial files or mixed partial files**

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The source file shall be identical to the ordered concatenation of the data of each partial segment for that given source if no losses occurred or if all corrupted blocks were successfully repaired. A mixed partial file handler may typically optimize this process by not reconstructing the complete source file.

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## 5 Box structures

### 5.1 Partial file general boxes

#### 5.1.1 Partial file box

##### 5.1.1.1 Definition

Box Type: 'pfil'

Container: File

Mandatory: No

Quantity: Zero or One

This box contains metadata information for the partial file. This metadata can be overridden with each partial segment.

A `PartialFileBox` may contain zero or one `DataReferenceBox` as defined in ISO/IEC 14496-12. Data references shall only be used to indicate an external location of (part of) the stored data; consequently, entries of the `DataReferenceBox` shall not use the flag value 0x000001.

**NOTE** Usage of data references allows building a partial file describing the recorded result of a transmission session stored in another format than the partial file format; for example, a partial file can be computed to describe the current reception state of a torrent session.

When enclosed, the `BoxFileIndexBox` provides a summary of the box hierarchy of the complete source file. It may be used to describe only type and size of a file-level box, or the complete or partial