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Part 21: Visual identity management application format

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Partie 21: Format pour application de gestion d'identité visuelle

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Foreword

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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).

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For an explanation of 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.

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/IEC 23000 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.

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Introduction

The main goal of the ISO/IEC 23000 series (also known as "MPEG-A") is to facilitate the swift development of innovative, standards-based multimedia services and applications by selecting and combining readily tested and verified tools taken from the MPEG body of standards.

Visual identity management is designed to enable users to control and manage privacy protection by defining a new framework and tools. It also provides to industry a coherent and consistent approach to manage privacy protection in order to be implemented in a variety of scenarios, applications or systems.

The main objective of preserving privacy protection is to enable security and confidentiality in the multimedia content chain. Many usages of image/video communication services, social networking and video sharing platforms have led to an increasing interest to protect users' privacy.

Traditionally, multimedia data security is achieved by cryptography solutions, which deal with encryption of data. This approach is called Naive Encryption Algorithm (NEA) and it treats the video bitstream as text data without paying attention to the structure of the compressed video. To this end, MPEG common encryption has been standardized in order to support encryption and key mapping methods for file format in ISO/IEC 23001-7 and for transport streaming in ISO/IEC 23001-9[3]. Consequently, bitstreams encrypted by those documents are decodable only after a correct decryption process even when only parts of the video are encrypted. Nevertheless, none of these formats allow signalling the encryption of a part of the picture (region), or indicating to the decoder that the encrypted bitstream can be partially decoded.

Moreover, all the access control is provided and performed globally without taking into account the image/video content and context. To restore citizens' confidence in online data collection practices, submitted media should be encrypted to protect privacy and only viewed with limited access that the user chooses: group of people, purpose of sharing, time, date, metadata, etc.

In order to provide privacy protection over processing and sharing of multimedia content, a flexible, effective and scalable mechanism is required to provide users a way to express their control desires in a form that can be processed and monitored systematically, consistently and persistently throughout the lifecycle of the multimedia content. There is currently no standardized format to represent privacy description information (PDI), hindering the interoperability between secured systems.

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Information technology — Multimedia application format (MPEG-A) —

Part 21:
Visual identity management application format

1 Scope

This document specifies the standard representation of the set of signalling and data used in the process of preserving privacy for storage sharing image/video.

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.

Rec. ITU-T H.264 | ISO/IEC 14496-10:—[1)], *Information technology — Coding of audio-visual objects — Part 10: Advanced Video Coding*

ISO/IEC 14496-15, *Information technology — Coding of audio-visual objects — Part 15: Carriage of network abstraction layer (NAL) unit structured video in the ISO base media file format*

ISO/IEC 23001-7:2016, *Information technology — MPEG systems technologies — Part 7: Common encryption in ISO base media file format files*

Rec. ITU-T H.265 | ISO/IEC 23008-2:—[2)], *Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 2: High efficiency video coding*

ISO/IEC 23008-12, *Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 12: Image File Format*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 14496-10, ISO/IEC 23008-2, ISO/IEC 23008-12 and the following 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
CSE
content sensitive encryption
selective encryption
image or video content protection scheme that can encrypt only a subset of the compressed bitstream data, preserving format compliant

1) Under preparation. Stage at the time of publication: ISO/IEC/DIS 14496-10:2018.

2) Under preparation. Stage at the time of publication: ISO/IEC/DIS 23008-2:2018.

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3.2
privacy description management
entity capable of managing the access control of different regions and associated with different authorizations

3.3
ROI
region of interest
sample or subset of an image within a media, identified for a particular purpose

4 Abbreviated terms

AVC	advanced video coding (as specified by Rec. ITU-T H.264 | ISO/IEC 14496-10)
CABAC	context-adaptive binary arithmetic coding (as specified in Rec. ITU-T H.264 | ISO/IEC 14496-10 and in Rec. ITU-T H.265 | ISO/IEC 23008-2)
CAVLC	context-adaptive variable-length coding (as specified in Rec. ITU-T H.264 | ISO/IEC 14496-10)
CTU	coding transform unit (as specified by Rec. ITU-T H.265 | ISO/IEC 23008-2)
HEVC	high efficiency video coding (as specified by Rec. ITU-T H.265 | ISO/IEC 23008-2)
MB	Macroblock unit (as specified by Rec. ITU-T H.264 | ISO/IEC 14496-10)
MPEG 21 UD	MPEG 21 user description (as specified by ISO/IEC 21000-22)
NAL	network abstraction layer (as specified in Rec. ITU-T H.264 | ISO/IEC 14496-10 and in Rec. ITU-T H.265 | ISO/IEC 23008-2)
SEI	supplemental enhancement information (as specified in Rec. ITU-T H.264 | ISO/IEC 14496-10 and in Rec. ITU-T H.265 | ISO/IEC 23008-2)

5 System for identity privacy management

5.1 General framework

To protect privacy content, stored and/or shared media should be encrypted by the service's user and should only be viewed with a well-defined limited access (group of people, purpose of sharing, time, date, metadata, etc.). Consequently, some particular regions of the video (e.g. human faces, text data) can only be seen by the authorized users, regardless of who captures and shares the video. Additionally, since multiple regions sometimes need different protections (e.g. multiple faces shown in the video), there is also a need to manage different control access (i.e. different key identifiers) within the same video bitstream, potentially for each frame, as shown in Figure 1.

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