

IEEE Standard for Systems of Advanced Audio and Video Coding

IEEE Computer Society

Sponsored by the
Standards Activities Board

Currently in preview, click buy full version

IEEE Standard for Systems of Advanced Audio and Video Coding

Sponsor

Standards Activities Board
of the
IEEE Computer Society

Approved 11 December 2013

IEEE-SA Standards Board

Currently in preview, click buy full version

Abstract: Storage file formats and real-time transport protocol (RTP) payload formats for IEEE 1857™ video and IEEE 1857.2™ audio are defined. The storage of video and audio not only uses the existing capabilities of the ISO base media file format, but also defines extensions to support specific features of the IEEE 1857 video codec and IEEE 1857.2 audio codec. The target applications and services include but are not limited to Internet media streaming, IPTV, video conference, video telephony, and video-on-demand.

Keywords: audio, box, file format, IEEE 1857.3™, NAL unit, packetization, RTP payload format, storage, system, track, transmission, video

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

Copyright © 2014 by The Institute of Electrical and Electronics Engineers, Inc.
All rights reserved. Published 20 January 2014. Printed in the United States of America.

IEEE is a registered trademark in the U.S. Patent & Trademark Office, owned by The Institute of Electrical and Electronics Engineers, Incorporated.

PDF: ISBN 978-0-7381-8866-9 STD98505
Print: ISBN 978-0-7381-8867-6 STDPD98505

IEEE prohibits discrimination, harassment, and bullying.

For more information, visit <http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html>.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Important Notices and Disclaimers Concerning IEEE Standards Documents

IEEE documents are made available for use subject to important notices and legal disclaimers. These notices and disclaimers, or a reference to this page, appear in all standards and may be found under the heading “Important Notice” or “Important Notices and Disclaimers Concerning IEEE Standards Documents.”

Notice and Disclaimer of Liability Concerning the Use of IEEE Standards Documents

IEEE Standards documents (standards, recommended practices, and guides), both full-use and trial-use, are developed within IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (“IEEE-SA”) Standards Board. IEEE (“the Institute”) develops its standards through a consensus development process, approved by the American National Standards Institute (“ANSI”) which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and participate without compensation from IEEE. While IEEE administers the process and establishes rules to promote fairness in the consensus development process, IEEE does not independently evaluate, test, or verify the accuracy of any of the information or the soundness of any judgments contained in its standards.

IEEE does not warrant or represent the accuracy or content of the material contained in its standards, and expressly disclaims all warranties (express, implied and statutory) not included in this or any other document relating to the standard, including, but not limited to, the warranties of: merchantability; fitness for a particular purpose; non-infringement; and quality, accuracy, effectiveness, currency, or completeness of material. In addition, IEEE disclaims any and all conditions relating to: results; and workmanlike effort. IEEE standards documents are supplied “AS IS” and “WITH ALL FAULTS.”

Use of an IEEE standard is wholly voluntary. The existence of an IEEE standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard.

In publishing and making its standards available, IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity nor is IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing any IEEE Standards document, should rely upon his or her own independent judgment in the exercise of reasonable care in any given circumstances or, as appropriate, seek the advice of a competent professional in determining the appropriateness of a given IEEE standard.

IN NO EVENT SHALL IEEE BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO: PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE PUBLICATION, USE OF, OR RELIANCE UPON ANY STANDARD, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE AND REGARDLESS OF WHETHER SUCH DAMAGE WAS FORESEEABLE.

Translations

The IEEE consensus development process involves the review of documents in English only. In the event that an IEEE standard is translated, only the English version published by IEEE should be considered the approved IEEE standard.

Official statements

A statement, written or oral, that is not processed in accordance with the IEEE-SA Standards Board Operations Manual shall not be considered or inferred to be the official position of IEEE or any of its committees and shall not be considered to be, or be relied upon as, a formal position of IEEE. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position of IEEE.

Comments on standards

Comments for revision of IEEE Standards documents are welcome from any interested party, regardless of membership affiliation with IEEE. However, IEEE does not provide consulting information or advice pertaining to IEEE Standards documents. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Since IEEE standards represent a consensus of concerned interests, it is important that any responses to comments and questions also receive the concurrence of a balance of interests. For this reason, IEEE and the members of its societies and Standards Coordinating Committees are not able to provide an instant response to comments or questions except in those cases where the matter has previously been addressed. For the same reason, IEEE does not respond to interpretation requests. Any person who would like to participate in discussions to an IEEE standard is welcome to join the relevant IEEE working group.

Comments on standards should be submitted to the following address:

Secretary, IEEE-SA Standards Board
445 Hoes Lane
Piscataway, NJ 08854 USA

Laws and regulations

Users of IEEE Standards documents should consult all applicable laws and regulations. Compliance with the provisions of any IEEE Standards document does not imply compliance to any applicable regulatory requirements. Implementers of the standards are responsible for observing or referring to the applicable regulatory requirements. IEEE does not, by the publication of its standards, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

Copyrights

IEEE draft and approved standards are copyrighted by IEEE under U.S. and international copyright laws. They are made available to IEEE and are adopted for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of engineering practices and methods. By making these documents available for use and adoption by public authorities and private users, IEEE does not waive any rights in copyright to the documents.

Photocopies

Subject to payment of the appropriate fee, IEEE will grant users a limited, non-exclusive license to photocopy portions of any individual standard for company or organizational internal use or individual, non-commercial use only. To arrange for payment of licensing fees, please contact Copyright Clearance Center, Customer Service, 222 Rosewood Drive, Danvers, MA 01923 USA; +1 978 750 8400. Permission to photocopy portions of any individual standard for educational classroom use can also be obtained through the Copyright Clearance Center.

Updating of IEEE Standards documents

Users of IEEE Standards documents should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of amendments, corrigenda, or errata. An official IEEE document at any point in time consists of the current edition of the document together with any amendments, corrigenda, or errata then in effect.

Every IEEE standard is subjected to review at least every ten years. When a document is more than ten years old and has not undergone a revision process, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE standard.

In order to determine whether a given document is the current edition and whether it has been amended through the issuance of amendments, corrigenda, or errata, visit the IEEE-SA Website at <http://ieeexplore.ieee.org/xpl/standards.jsp> or contact IEEE at the address listed previously. For more information about the IEEE SA or IEEE's standards development process, visit the IEEE-SA Website at <http://standards.ieee.org>.

Errata

Errata, if any, for all IEEE standards can be accessed on the IEEE-SA Website at the following URL: <http://standards.ieee.org/findstds/errata/index.html>. Users are encouraged to check this URL for errata periodically.

Patents

Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken by the IEEE with respect to the existence or validity of any patent rights in connection therewith. If a patent holder or patent applicant has filed a statement of assurance via an Accepted Letter of Assurance, then the statement is listed on the IEEE-SA Website at <http://standards.ieee.org/about/sasb/patcom/patents.html>. Letters of Assurance may indicate whether the Submitter is willing or not willing to grant licenses under patent rights without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination to applicants desiring to obtain such licenses.

Essential Patent Claims may exist for which a Letter of Assurance has not been received. The IEEE is not responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patents Claims, or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from the IEEE Standards Association.

Participants

At the time this IEEE standard was completed, the Audio Video Coding Working Group had the following membership:

Wen Gao, *Chair*
Cliff Reader, *Vice Chair*

Xilin Chen
Pengfei Gao
Tiejun Huang

Longshe Huo
Luntian Mou
Jiasi Shen
Shuang Shu

Jun Sun
Lei Wang
Yekui Wang

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

Oscar Au
Jianfei Cai
Juan Carreon
Jianwen Chen
Xilin Chen
Keith Chow
John Cole
Weibei Dou
P. Eastman
Wen Gao
Matthew Goldman
Randall C. Groves
Zongming Guo
Yun He
Werner Hoelzl
Ruimin Hu
Tiejun Huang
Longshe Huo
Noriyuki Ikeuchi
Akio Iso
Euee Seon Jang
Huizhu Jia

Ming Jiang
Tingting Jiang
Piotr Karocki
Thomas Kurihara
Houqiang Li
Jia Li
Jinghua Li
Weiping Li
Fan Liang
Weisi Lin
Jiaying Liu
Siwei Ma
Wei Ma
Luntian Mou
Michael N. P. O'Sullivan
Xingde Qiu
Ulrich Rohlf
Julian P. O'Riordan
Honggang Qi
Lei Qin
Benjamin Rolfe
Bartien Sayogo

Guangming Shi
Hebin Sun
Walter Struppler
Liang Sun
Jiande Sun
Jun Sun
Yonghong Tian
John Vergis
Ronggang Wang
Xiaolin Wu
Hongkai Xiong
Xiaokang Yang
Baocai Yin
Lu Yu
Janusz Zalewski
Chen-Xiong Zhang
Li Zhang
Xinggong Zhang
Xiaozhen Zheng
Daidi Zhong
Huan Zhou
Wenwu Zhu

When the IEEE-SA Standards Board approved this standard on 11 December 2013, it had the following membership:

John Kulick, *Chair*
David J. Law, *Vice Chair*
Richard H. Hulett, *Past Chair*
Konstantinos Karachalios, *Secretary*

Masayuki Ariyoshi
Peter Balma
Farooq Bari
Ted Burse
Stephen Dukes
Jean-Philippe Faure
Alexander Gelman

Mark Halpin
Gary Hoffman
Paul Houzé
Jim Hughes
Michael Janezic
Joseph L. Koepfinger*
Oleg Logvinov
Ron Petersen

Gary Robinson
Jon Walter Rosdahl
Adrian Stephens
Peter Sutherland
Yatin Trivedi
Phil Winston
Yu Yuan

*Member Emeritus

Also included are the following nonvoting IEEE-SA Standards Board liaisons:

Richard DeBlasio, *DOE Representative*
Michael Janezic, *NIST Representative*

Julie Alessi
IEEE Standards Program Manager, Document Development

Maria Zeman
IEEE Standards Program Manager, Technical Program Development

Introduction

This introduction is not part of IEEE Std 1857.3-2013, IEEE Standard for Systems of Advanced Audio and Video Coding.

This standard defines the storage file formats and RTP payload formats for IEEE 1857 video and IEEE 1857.2 audio.

Currently in preview, click buy full version

Contents

1. Overview	1
1.1 Scope	1
1.2 Purpose	1
2. Normative references.....	2
3. Definitions, acronyms, and abbreviations	2
3.1 Definitions	2
3.2 Acronyms and abbreviations	3
4. File format for IEEE 1857 video	4
4.1 NAL unit.....	4
4.2 IEEE 1857 video elementary stream and sample definitions.....	5
4.3 Metadata for surveillance video.....	11
5. RTP payload format for IEEE 1857 video	14
5.1 Network abstraction layer unit.....	14
5.2 RTP payload format.....	15
5.3 Packetization rules	27
5.4 Payload format parameters	28
6. File format for IEEE 1857.2 audio	38
6.1 Network abstraction layer unit.....	38
6.2 IEEE 1857.2 audio elementary stream and sample definition.....	39
7. RTP payload format for IEEE 1857.2 audio.....	42
7.1 Network abstraction layer unit.....	42
7.2 RTP payload format.....	42
7.3 Packetization rules	50
7.4 Payload format parameters	51
Annex A (informative) De-packetization process	59

IEEE Standard for Systems of Advanced Audio and Video Coding

IMPORTANT NOTICE: IEEE Standards documents are not intended to ensure safety, security, health, or environmental protection, or ensure against interference with or from other devices or networks. Implementers of IEEE Standards documents are responsible for determining and complying with all appropriate safety, security, environmental, health, and interference protection practices and all applicable laws and regulations.

This IEEE document is made available for use subject to important notices and legal disclaimers. These notices and disclaimers appear in all publications containing this document and may be found under the heading “Important Notice” or “Important Notices and Disclaimers Concerning IEEE Documents.” They can also be obtained on request from IEEE or viewed at <http://standards.ieee.org/IPR/disclaimers.html>.

1. Overview

1.1 Scope

This standard specifies the storage file format and real-time transport protocol (RTP) payload format for the compressed video data created by IEEE Std 1857™ and the compressed audio data created by IEEE Std 1857.2™.¹ The storage format is aimed at extending the *ISO base media file format* to support specific features of IEEE 1857 video and IEEE 1857.2 audio, and the RTP payload format defines the specific payload format to convey IEEE 1857 video and IEEE 1857.2 audio by RTP packets.

1.2 Purpose

This standard provides regular and efficient system level tool sets that describe the file storage format and RTP payload format for IEEE Std 1857 video and IEEE 1857.2 audio while storing and streaming over Internet protocol (IP) networks.

¹ Information on references can be found in Clause 2.