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ITU-T H.264.2

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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Coding of moving video

Reference software for H.264 advanced video coding

CAUTION !

PREPUBLISHED RECOMMENDATION

This prepublication is an unedited version of a recently approved Recommendation. It will be replaced by the published version after editing. Therefore, there will be differences between this prepublication and the published version.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU [had/had not] received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

ITU-T Recommendation H.264.2

Reference software for H.264 Advanced Video Coding

Summary

H.264.2 provides accompanying reference software for ITU-T Rec. H.264 | ISO/IEC 14496-10 as an electronic attachment. The software is an integral part of H.264.2.

The purpose of this Recommendation is to provide the following.

- Reference decoder software capable of decoding bitstreams that conform to ITU-T Rec. H.264 | ISO/IEC 14496-10 in a manner that conforms to the decoding process specified in ITU-T Rec. H.264 | ISO/IEC 14496-10.
- Reference encoder software capable of producing bitstreams that conform to ITU-T Rec. H.264 | ISO/IEC 14496-10.

The use of this reference software is not required for making an implementation of an encoder or decoder in conformance to ITU-T Rec. H.264 | ISO/IEC 14496-10. Requirements established in ITU-T Rec. H.264 | ISO/IEC 14496-10 take precedence over the behaviour of the reference software.

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Foreword

Reference software is useful in aiding users of a video coding standard to establish and test conformance and interoperability, and to educate users and demonstrate the capabilities of the standard. For these purposes, the accompanying software is provided as an aid for the study and implementation of ITU-T Rec. H.264 | ISO/IEC 14496-10 advanced video coding.

Introduction

This document is the text of the ITU-T Rec. H.264.2 with accompanying reference software for ITU-T Rec. H.264 | ISO/IEC 14496-10 Advanced Video Coding provided as an electronic attachment. The software has been jointly developed by ITU-T Video Coding Experts Group (VCEG) and the ISO/IEC Moving Picture Experts Group (MPEG). It is published as technically-aligned twin text in both organizations ITU-T and ISO/IEC. (In ISO/IEC it is published in ISO/IEC 14496-5.)

ITU-T Rec. H.264.2 (2004 E)
ITU-T RECOMMENDATION H.264.2

REFERENCE SOFTWARE FOR H.264 ADVANCED VIDEO CODING

0 Introduction

This clause does not form an integral part of this Recommendation.

This document accompanies reference software for ITU-T Rec. H.264 | ISO/IEC 14496-10 Advanced Video Coding. The reference software includes both encoder and decoder functionality.

0.1 Purpose

This clause does not form an integral part of this Recommendation.

The purpose of this Recommendation is to provide the following.

– Reference decoder software capable of decoding bitstreams that conform to ITU-T Rec. H.264 | ISO/IEC 14496-10 in a manner that conforms to the decoding process specified in ITU-T Rec. H.264 | ISO/IEC 14496-10.

– Reference encoder software capable of producing bitstreams that conform to ITU-T Rec. H.264 | ISO/IEC 14496-10.

0.2 Examples of use

This clause does not form an integral part of this Recommendation.

Some examples of uses that may be appropriate for the reference decoder software are as follows.

– As an illustration of how to perform the decoding process specified in ITU-T Rec. H.264 | ISO/IEC 14496-10.

– As the starting basis for the implementation of a decoder that conforms to ITU-T Rec. H.264 | ISO/IEC 14496-10.

– For testing the conformance of a decoder implementation with the decoding process specified in ITU-T Rec. H.264 | ISO/IEC 14496-10 (as the values of the samples in all decoded pictures and the relative ordering of those pictures will be identical from all conforming decoder implementations that support the profile and level used in a bitstream that conforms to ITU-T Rec. H.264 | ISO/IEC 14496-10).

– For testing the conformance of a bitstream to the constraints specified for bitstream conformance in ITU-T Rec. H.264 | ISO/IEC 14496-10, as the software can detect and report many bitstream conformance violations.

NOTE – However, the lack of the detection of any conformance violation by the reference decoder software should not be considered as definitive proof that the bitstream conforms to all constraints specified for bitstream conformance in ITU-T Rec. H.264 | ISO/IEC 14496-10.

Some examples of uses that may be appropriate for the reference encoder software are as follows.

– As an illustration of how to perform an encoding process that produces bitstreams that conform to the constraints specified for bitstream conformance in ITU-T Rec. H.264 | ISO/IEC 14496-10.

– As the starting basis for the implementation of an encoder that conforms to ITU-T Rec. H.264 | ISO/IEC 14496-10.

– As a means of generating bitstreams for testing the conformance of a decoder implementation with the decoding process specified in ITU-T Rec. H.264 | ISO/IEC 14496-10.

– As a means of evaluating and demonstrating examples of the quality that can be achieve by an encoding process that conforms to ITU-T Rec. H.264 | ISO/IEC 14496-10.

NOTE – However, no guarantee of the quality that will be achieved by an encoder is provided by its conformance to ITU-T Rec. H.264 | ISO/IEC 14496-10, as the conformance of an encoder to ITU-T Rec. H.264 | ISO/IEC 14496-10

is defined only in terms of format constraints imposed on the bitstream syntax. Thus, while the reference encoder software may suffice to provide some illustrative examples of what quality can be achieved in conformance to ITU-T Rec. H.264 | ISO/IEC 14496-10, it provides neither an assurance of minimum guaranteed video encoding quality nor maximum achievable video encoding quality.

0.3 Warranty disclaimer

This clause does not form an integral part of this Recommendation.

Regardless of any and all statements made herein or elsewhere regarding the possible uses of the reference software, the following disclaimers of warranty apply to the provided reference software.

– The ITU disclaims any and all warranties, whether express, implied, or statutory, including any implied warranties of merchantability or of fitness for a particular purpose.

– In no event shall the contributor(s) or the ITU be liable for any incidental, punitive, or consequential damages of any kind whatsoever arising from the use of these programs.

– This disclaimer of warranty extends to the user of these programs and user's customers, employees, agents, transferees, successors, and assigns.

– The ITU does not represent or warrant that the programs furnished hereunder are free of infringement of any third-party patents.

– Commercial implementations of ITU-T Recommendations, including shareware, may be subject to royalty fees to patent holders.

– Information regarding the ITU-T patent policy is available from the ITU Web site at http://www.itu.int.

1 Scope

This Recommendation provides accompanying reference software for ITU-T Rec. H.264 | ISO/IEC 14496-10 as an electronic attachment. The software is an integral part of this Recommendation.

The use of this reference software is not required for making an implementation of an encoder or decoder in conformance to ITU-T Rec. H.264 | ISO/IEC 14496-10. Requirements established in ITU-T Rec. H.264 | ISO/IEC 14496-10 take precedence over the behaviour of the reference software.

2 Normative references

2.1 General

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

2.2 Identical Recommendations | International Standards

– None.

2.3 Paired Recommendations | International Standards equivalent in technical content

– ITU-T Recommendation H.264 (2004), *Advanced video coding for generic audiovisual services.*

(*technically-aligned twin text with)*

ISO/IEC 14496-10, *Information technology – Coding of audiovisual objects – Part 10: Advanced video coding.*

2.4 Additional references

– None.

3 Definitions

For the purposes of this Recommendation, the terms, definitions, abbreviations and symbols specified in ITU-T Rec. H.264 | ISO/IEC 14496-10 (particularly in clause 3) apply. Definitions 3.1, 3.2, and 3.3 below replace the corresponding definitions in ITU-T Rec. H.264 | ISO/IEC 14496-10. Definitions 3.4 and 3.5 are additional definitions.

3.1 **bitstream**: A sequence of bits that may conform to ITU-T Rec. H.264 | ISO/IEC 14496-10. A bitstream that conforms to ITU-T Rec. H.264 | ISO/IEC 14496-10 will contain one or more IDR slices, and may contain additional, I, P, B, SI, or SP slices.

3.2 **decoder**: An embodiment of a process that operates on a *bitstream* and may conform to the decoding process requirements specified for conformance to ITU-T Rec. H.264 | ISO/IEC 14496-10. The scope of decoder, as considered herein, does not include a display process, which is outside the scope of this Recommendation.

3.3 **encoder**: An embodiment of a process, not specified in this Recommendation, that produces a *bitstream*.

3.4 **reference software decoder**: The decoding software accompanying this specification.

3.5 **reference software encoder**: The decoding software accompanying this specification.

4 Abbreviations

For the purposes of this Recommendation, relevant abbreviations are specified in clause 4 of ITU-T Rec. H.264 | ISO/IEC 14496-10.

5 Conventions

For the purposes of this Recommendation, relevant conventions are specified in clause 5 in ITU-T Rec. H.264 | ISO/IEC 14496-10.

6 Reference software for ITU-T Rec. H.264 | ISO/IEC 14496-10

The reference software for ITU-T Rec. H.264 | ISO/IEC 14496-10 is found in the electronic attachment to this Recommendation.