
**Information technology — Generic
coding of moving pictures and
associated audio information —**

**Part 1:
Systems**

**AMENDMENT 1: Carriage of LCEVC and
other improvements**

*Technologies de l'information — Codage générique des images
animées et du son associé —*

*Partie 1: Systèmes
AMENDEMENT 1: Transport de LCEVC et autres améliorations*



iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/IEC 13818-1:2022/Amd 1:2023

<https://standards.iteh.ai/catalog/standards/sist/2522bec6-676f-4cea-af05-4e7f30a85a77/iso-iec-13818-1-2022-amd-1-2023>



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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.

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) or the IEC list of patent declarations received (see <https://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 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. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by ITU-T as Amendment 1 to ITU-T H.222.0 (06/2021) and drafted in accordance with its editorial rules, in collaboration with 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 13818 series can be found on the ISO and IEC websites.

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 and www.iec.ch/national-committees.

**Information technology – Generic coding of moving pictures and associated
audio information: Systems**

Amendment 1

Carriage of LCEVC and other improvements

Summary

Rec. ITU-T H.222.0 | ISO/IEC 13818-1 was developed in 1994 to principally support the combination and synchronization of video and audio coding methods defined in ISO/IEC 13818 Part 2 (Rec. ITU-T H.262) and Part 3. It has since then been extended to support additional video and audio coding specifications as well as multiple kinds of metadata.

Amendment 1 to ITU-T H.222.0 (2021) | ISO/IEC 13818-1:2022 extends the specification by defining how LCEVC (ISO/IEC 23094-2) is carried over MPEG-2 systems. It also defines an additional descriptor signalling the kind of media service and its usage. Further, it includes clarifications for the specification of carriage of JPEG XS.

All of this is done in a way that is compatible with the existing support for other codecs.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T H.222.0	1995-07-10	15	11.1002/1000/1071
1.1	ITU-T H.222.0 (1995) Amd. 1	1996-11-11	16	11.1002/1000/3834
1.2	ITU-T H.222.0 (1995) Amd. 2	1996-11-11	16	11.1002/1000/4096
1.3	ITU-T H.222.0 (1995) Technical Cor. 1	1998-02-06	16	11.1002/1000/4532
1.4	ITU-T H.222.0 (1995) Amd. 3	1998-02-06	16	11.1002/1000/4228
1.5	ITU-T H.222.0 (1995) Amd. 4	1998-02-06	16	11.1002/1000/4229
1.6	ITU-T H.222.0 (1995) Amd. 5	1999-05-27	16	11.1002/1000/4498
1.7	ITU-T H.222.0 (1995) Amd. 6	1999-05-27	16	11.1002/1000/4671
1.8	ITU-T H.222.0 (1995) Amd. 7	2000-02-17	16	11.1002/1000/4926
2.0	ITU-T H.222.0	2000-02-17	16	11.1002/1000/5142
2.1	ITU-T H.222.0 (2000) Technical Cor. 1	2001-03-01	16	11.1002/1000/5419
2.2	ITU-T H.222.0 (2000) Technical Cor. 2	2002-03-29	16	11.1002/1000/5675
2.3	ITU-T H.222.0 (2000) Amd. 1	2002-12-14	16	11.1002/1000/6190
2.4	ITU-T H.222.0 (2000) Amd. 1/Cor. 1	2003-06-29	16	11.1002/1000/6449
2.5	ITU-T H.222.0 (2000) Amd. 2	2003-06-29	16	11.1002/1000/6363
2.6	ITU-T H.222.0 (2000) Amd. 3	2004-03-15	16	11.1002/1000/7208
2.7	ITU-T H.222.0 (2000) Technical Cor. 3	2005-01-08	16	11.1002/1000/7435
2.8	ITU-T H.222.0 (2000) Amd. 4	2005-01-08	16	11.1002/1000/7436
2.9	ITU-T H.222.0 (2000) Amd. 5	2005-01-08	16	11.1002/1000/7437
2.10	ITU-T H.222.0 (2000) Technical Cor. 4	2005-09-13	16	11.1002/1000/8560
3.0	ITU-T H.222.0	2006-05-29	16	11.1002/1000/8802

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

3.1	ITU-T H.222.0 (2006) Amd. 1	2007-01-13	16	11.1002/1000/9024
3.2	ITU-T H.222.0 (2006) Amd. 2	2007-08-29	16	11.1002/1000/9214
3.3	ITU-T H.222.0 (2006) Cor. 1	2008-06-13	16	11.1002/1000/9471
3.4	ITU-T H.222.0 (2006) Cor. 2	2009-03-16	16	11.1002/1000/9692
3.5	ITU-T H.222.0 (2006) Amd. 3	2009-03-16	16	11.1002/1000/9691
3.6	ITU-T H.222.0 (2006) Cor. 3	2009-12-14	16	11.1002/1000/10621
3.7	ITU-T H.222.0 (2006) Cor. 4	2009-12-14	16	11.1002/1000/10622
3.8	ITU-T H.222.0 (2006) Amd. 4	2009-12-14	16	11.1002/1000/10623
3.9	ITU-T H.222.0 (2006) Amd. 5	2011-05-14	16	11.1002/1000/11287
3.10	ITU-T H.222.0 (2006) Amd. 6	2011-05-14	16	11.1002/1000/11288
4.0	ITU-T H.222.0	2012-06-29	16	11.1002/1000/11655
4.1	ITU-T H.222.0 (2012) Amd. 1	2014-01-13	16	11.1002/1000/12054
4.2	ITU-T H.222.0 (2012) Amd. 2	2014-01-13	16	11.1002/1000/12055
4.3	ITU-T H.222.0 (2012) Amd. 3	2014-01-13	16	11.1002/1000/12056
4.4	ITU-T H.222.0 (2012) Amd. 4	2014-01-13	16	11.1002/1000/12057
4.5	ITU-T H.222.0 (2012) Amd. 5	2014-10-14	16	11.1002/1000/12306
5.0	ITU-T H.222.0	2014-10-14	16	11.1002/1000/12359
5.1	ITU-T H.222.0 (2014) Amd. 1	2015-04-29	16	11.1002/1000/12452
5.2	ITU-T H.222.0 (2014) Amd. 1 Cor. 1	2015-11-29	16	11.1002/1000/12625
5.3	ITU-T H.222.0 (2014) Amd. 2	2015-12-14	16	11.1002/1000/12632
5.4	ITU-T H.222.0 (2014) Amd. 3	2015-12-14	16	11.1002/1000/12633
5.5	ITU-T H.222.0 (2014) Amd. 1 Cor. 2	2016-07-14	16	11.1002/1000/12899
5.5	ITU-T H.222.0 (2014) Cor. 1	2016-07-14	16	11.1002/1000/12903
5.7	ITU-T H.222.0 (2014) Amd. 4	2016-07-14	16	11.1002/1000/12900
5.8	ITU-T H.222.0 (2014) Amd. 5	2016-07-14	16	11.1002/1000/12901
5.9	ITU-T H.222.0 (2014) Amd. 6	2016-07-14	16	11.1002/1000/12902
5.10	ITU-T H.222.0 (2014) Amd. 3 Cor. 1	2017-03-01	16	11.1002/1000/13184
5.10	ITU-T H.222.0 (2014) Cor. 2	2017-03-01	16	11.1002/1000/13188
5.12	ITU-T H.222.0 (2014) Amd. 7	2017-03-01	16	11.1002/1000/13186
5.13	ITU-T H.222.0 (2014) Amd. 8	2017-03-01	16	11.1002/1000/13187
6.0	ITU-T H.222.0	2017-03-01	16	11.1002/1000/13269
6.1	ITU-T H.222.0 (2017) Amd. 1	2017-12-14	16	11.1002/1000/13431
7.0	ITU-T H.222.0	2018-08-29	16	11.1002/1000/13664
7.1	ITU-T H.222.0 (2018) Cor. 1	2019-11-29	16	11.1002/1000/14106
7.2	ITU-T H.222.0 (2018) Amd. 1	2019-11-29	16	11.1002/1000/14105
8.0	ITU-T H.222.0 (V8)	2021-06-13	16	11.1002/1000/14658
8.1	ITU-T H.222.0 (2021) Cor. 1	2022-12-14	16	11.1002/1000/15172
8.2	ITU-T H.222.0 (2021) Amd. 1	2022-12-14	16	11.1002/1000/15171

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). 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.

[ISO/IEC 13818-1:2022/Amd 1:2023](https://standards.iteh.ai/catalog/standards/sist/2522bec6-676f-4cea-af05-4e7f30a85a77/iso-iec-13818-1-2022-amd-1-2023)

<https://standards.iteh.ai/catalog/standards/sist/2522bec6-676f-4cea-af05-4e7f30a85a77/iso-iec-13818-1-2022-amd-1-2023>

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 received notice of intellectual property, protected by patents/software copyrights, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the appropriate ITU-T databases available via the ITU-T website at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2023

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

CONTENTS

	Page
1) Clause 1.2.3.....	1
2) Clauses 2.1.90 <i>bis</i> to 2.1.90 <i>ter</i>	1
3) Clause 2.4.2.7.....	1
4) Clause 2.4.3.7.....	2
5) Clause 2.4.4.10.....	2
6) Clause 2.6.90.....	2
7) Clause 2.6.91.....	3
8) Clause 2.6.127.....	3
9) Clauses 2.6.137 to 2.6.142	3
10) Clause 2.25.....	11
11) Annex W, clause W.2.....	12
12) Annex W, clause W.3.....	12
13) Bibliography.....	12

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO/IEC 13818-1:2022/Amd 1:2023

<https://standards.iteh.ai/catalog/standards/sist/2522bec6-676f-4cea-af05-4e7f30a85a77/iso-iec-13818-1-2022-amd-1-2023>

**INTERNATIONAL STANDARD ISO/IEC 13818-1
RECOMMENDATION ITU-T H.222.0**

**Information technology – Generic coding of moving pictures and associated
audio information: Systems**

Amendment 1

Carriage of LCEVC and other improvements

Scope

This amendment extends 13818-1 by defining:

- how LCEVC (ISO/IEC 23094-2) is carried over MPEG-2 systems (ITU-T H.222.0 | ISO/IEC 13818-1);
- an additional descriptor signalling the kind of media service and its usage.

It does this in a compatible way with existing support for other codecs.

It includes clarifications for the specification of carriage of JPEG XS.

1) Clause 1.2.3

In 1.2.3, Additional references, add the following references:

- ISO/IEC 23094-2:2021, *Information technology – General video coding – Part 2: Low complexity enhancement video coding*.
- IETF BCP 47: IETF RFC 4647 (2006) *Matching of Language Tags* combined with IETF RFC 5646 (2009), *Tags for Identifying Languages*.
- ANSI/SCTE 35 (2019), *Digital Program Insertion Cueing Message for Cable*.

2) Clauses 2.1.90bis to 2.1.90ter

After clause 2.1.90, add the following clauses 2.1.90bis to 2.1.90ter:

2.1.90bis LCEVC access unit (system): An access unit as defined for byte streams in ISO/IEC 23094-2 with the constraints specified in clause 2.25.1.

2.1.90ter LCEVC video sequence (system): Coded video sequence as defined in ISO/IEC 23094-2.

3) Clause 2.4.2.7

In clause 2.4.2.7, replace the sixth paragraph:

The delay of any data through the system target decoder buffers shall be less than or equal to one second except for still picture video data, ISO/IEC 14496 streams, ISO/IEC 23008-2 streams, ISO/IEC 23090-3 streams and ISO/IEC 23094-1 streams. Specifically: $td_n(j) - t(i) \leq 1$ second for all j , and all bytes i in access unit $A_n(j)$.

with:

The delay of any data through the system target decoder buffers shall be less than or equal to one second except for still picture video data, ISO/IEC 14496, ISO/IEC 23008-2, ISO/IEC 23090-3, ISO/IEC 23094-1 and ISO/IEC 23094-2 streams. Specifically: $td_n(j) - t(i) \leq 1$ second for all j , and all bytes i in access unit $A_n(j)$.

Further replace the eighth paragraph:

For ISO/IEC 14496, ISO/IEC 23008-2, ISO/IEC 23090-3 and ISO/IEC 23094-1 streams, the delay is constrained by $td_n(j) - t(i) \leq 10$ seconds for all j , and all bytes i in access unit $A_n(j)$.

with:

For ISO/IEC 14496, ISO/IEC 23008-2, ISO/IEC 23090-3, ISO/IEC 23094-1 and ISO/IEC 23094-2 streams, the delay is constrained by $td_n(j) - t(i) \leq 10$ seconds for all j , and all bytes i in access unit $A_n(j)$.

4) **Clause 2.4.3.7**

In clause 2.4.3.7, in Table 2-22, replace:

1110 xxxx	Rec. ITU-T H.262 ISO/IEC 13818-2, ISO/IEC 11172-2, ISO/IEC 14496-2, Rec. ITU-T H.264 ISO/IEC 14496-10, Rec. ITU-T H.265 ISO/IEC 23008-2, Rec. ITU-T H.266 ISO/IEC 23090-3 or ISO/IEC 23094-1 video stream number xxxx
-----------	---

with:

1110 xxxx	Rec. ITU-T H.262 ISO/IEC 13818-2, ISO/IEC 11172-2, ISO/IEC 14496-2, Rec. ITU-T H.264 ISO/IEC 14496-10, Rec. ITU-T H.265 ISO/IEC 23008-2, Rec. ITU-T H.266 ISO/IEC 23090-3, ISO/IEC 23094-1 or ISO/IEC 23094-2 video stream number xxxx
-----------	--

Further, in the **PTS (presentation time stamp)** section, insert the following new paragraph after the paragraph starting with "For EVC video streams ...":

For LCEVC video streams, the PTS shall be present in the PES packet header, and it shall refer to only one LCEVC access unit that commences in this PES packet. To achieve consistency between the STD model and the HRD model defined in Annex C of ISO/IEC 23094-2, for each LCEVC access unit the PTS value in the STD shall, within its accuracy, indicate the same instant in time as the nominal DPB output time in the HRD, as defined in Annex C of ISO/IEC 23094-2.

Further, in the **DTS (decoding time stamp)** section, insert the following new paragraph after the paragraph starting with "For EVC video streams ...":

For LCEVC video streams, the DTS shall not be present in the PES packet header because the LCEVC decoding process is strictly in presentation order. This restriction on the strict coincidence of decoding order and presentation order of the access units refers exclusively to the LCEVC video stream. On the other hand, the base video stream that the LCEVC video stream enhances has no such restriction, which means that in this case the decoding order and the presentation order can be different.

5) **Clause 2.4.4.10**

In 2.4.4.10 in Table 2-34, replace:

0x36 .. 0x7E	Rec. ITU-T H.222.0 ISO/IEC 13818-1 reserved
--------------	---

with:

0x36	LCEVC video stream conforming to one or more profiles defined in ISO/IEC 23094-2
0x37 .. 0x7E	Rec. ITU-T H.222.0 ISO/IEC 13818-1 reserved

6) **Clause 2.6.90**

In 2.6.90 in Table 2-109, replace:

```

else if ( extension_descriptor_tag == 0x16) {
    EVC_timing_and_HRD_descriptor()
}
    
```

with:

```

else if ( extension_descriptor_tag == 0x16) {
    EVC_timing_and_HRD_descriptor()
}
else if ( extension_descriptor_tag == 0x17) {
    LCEVC_video_descriptor ()
}
else if ( extension_descriptor_tag == 0x18) {
    LCEVC_linkage_descriptor()
}
    
```

```

else if ( extension_descriptor_tag == 0x19) {
    Media_service_kind_descriptor()
}

```

7) Clause 2.6.91

In clause 2.6.91, right before Table 2-110, add:

LCEVC_video_descriptor() – This structure is defined in 2.6.137 and 2.6.138.

LCEVC_linkage_descriptor() – This structure is defined in 2.6.139 and 2.6.140.

Media_service_kind_descriptor() – This structure is defined in 2.6.141 and 2.6.142

Further, in Table 2-110, replace:

0x17 .. 0xFF	n/a	n/a	Rec. ITU-T H.222.0 ISO/IEC 13818-1 Reserved
--------------	-----	-----	---

with

0x17	X	X	LCEVC_video_descriptor()
0x18	X	X	LCEVC_linkage_descriptor()
0x19	X	X	Media_service_kind_descriptor()
0x1A .. 0xFF	n/a	n/a	Rec. ITU-T H.222.0 ISO/IEC 13818-1 Reserved

8) Clause 2.6.127

In clause 2.6.127, in Table 2-132, remove the **descriptor_tag** and **descriptor_length** fields.

9) Clauses 2.6.137 to 2.6.142

After 2.6.136, add the following clauses 2.6.137 to 2.6.142:

2.6.137 LCEVC video descriptor

Table 2-141bis provides a description of the LCEVC video descriptor.

Table 2-141bis – LCEVC video descriptor

Syntax	No. of bits	Mnemonic
LCEVC_video_descriptor() {		
lcevc_stream_tag	8	uimsbf
profile_idc	4	uimsbf
level_idc	4	uimsbf
sublevel_idc	2	uimsbf
processed_planes_type_flag	1	bslbf
picture_type_bit_flag	1	bslbf
field_type_bit_flag	1	bslbf
reserved	3	bslbf
HDR_WCG_idc	2	uimsbf
reserved_zero_2bit	2	bslbf
video_properties_tag	4	uimsbf
}		

2.6.138 Semantic definition of fields of LCEVC video descriptor

lcevc_stream_tag – This is an 8-bit field specifying the identifier of an association between base and enhancement streams of an LCEVC encoding.