



IEC 61937-11

Edition 2.0 2021-07
REDLINE VERSION

INTERNATIONAL STANDARD



**Digital audio – Interface for non-linear PCM encoded audio bitstreams applying
IEC 60958 –
Part 11: MPEG-4 AAC and its extensions and MPEG-D USAC in LATM/LOAS**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.160.30; 33.170

ISBN 978-2-8322-5016-7

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	2
INTRODUCTION to Amendment 1.....	2
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	7
3.1 Terms and definitions	7
3.2 Abbreviated terms	9
4 Mapping of the audio bit stream on to IEC 61937-1	10
4.1 General.....	10
4.2 Burst-info for MPEG-4 AAC and its extensions and MPEG-D USAC in LATM/LOAS.....	10
5 Format of data-burst for MPEG-4 AAC and its extensions and MPEG-D USAC in LATM/LOAS	11
5.1 General.....	11
5.2 Pause data-bursts for MPEG-4 AAC and its extensions in LATM/LOAS	11
5.3 Audio data-bursts.....	11
5.3.1 MPEG-4 AAC and its extensions in LATM/LOAS.....	11
5.3.2 USAC in LATM/LOAS.....	13
5.3.3 LATM/LOAS framing	13
5.3.4 Latency.....	15
Annex A (informative) Calculation of delay and data-burst repetition rates – guidelines.....	17
A.1 Examples.....	17
A.2 Guidelines.....	18
Annex B (normative) High-speed transmission.....	19
B.1 Indication.....	19
B.2 Example.....	19
Annex C (informative) MPEG-4 and MPEG-D audio profiles and audio object types.....	20
C.1 Overview.....	20
C.2 MPEG-4 AAC Profile	20
C.3 MPEG-4 High-Efficiency AAC Profile	20
C.4 MPEG-4 High-Efficiency AAC v2 Profile.....	20
C.5 MPEG-D Baseline USAC Profile	21
C.6 MPEG-D Extended HE-AAC Profile.....	21
Bibliography	22
Figure 1 – Data-burst structure.....	12
Figure 2 – Data-burst structure.....	14
Figure 3 – Latency diagram for burst reception and decoding.....	16
Figure C.1 – MPEG-4 /MPEG-D audio profiles structure	20
Table 1 – Values for data-type bits 0-4 and data-type bits 5-6.....	10
Table 2 – Repetition period of pause data-bursts.....	11

Table 3 – Data-type-dependent information for MPEG-4 AAC audio and its extensions in LATM/LOAS	12
Table 4 – Data-type-dependent information for USAC audio in LATM/LOAS	14
Table A.1 – Examples – Calculation of delay and data-burst repetition rates for AAC_LC and HE AAC	17
Table A.2 – Examples – Calculation of delay and data-burst repetition rates for USAC	18
Table B.1 – Indication fields	19
Table B.2 – Signalling example	19

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DIGITAL AUDIO – INTERFACE FOR NON-LINEAR PCM
ENCODED AUDIO BITSTREAMS APPLYING IEC 60958 –****Part 11: MPEG-4 AAC and its extensions
and MPEG-D USAC in LATM/LOAS**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 61937-11:2010+AMD1:2018 CSV. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 61937-11 has been prepared by technical area 20: Analogue and digital audio, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This second edition cancels and replaces the first edition published in 2010, and Amendment 1:2018. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) MPEG-D USAC has been added.

The text of this International Standard is based on the following documents:

Draft	Report on voting
100/3523/CDV	100/3582/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

A list of all parts in the IEC 61937 series, published under the general title *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958*, can be found on the IEC website.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Modern digital video broadcasting standards, such as DVB, include support for the MPEG-4 HE AAC and/or HE AAC v2 audio codecs specified in ISO/IEC 14496-3. An increasing number of countries are adopting these new codecs for their standard-definition and high-definition digital video broadcasting services and have started with implementations.

For MPEG-2 AAC audio (ISO/IEC 13818-7), the specified framing format for the audio bit stream is ADTS and its transport over an IEC 60958 interface is specified in IEC 61937-6.

However, the MPEG-4 (ISO/IEC 14496-3) and MPEG-D (ISO/IEC 23003-3) audio codecs introduce new features and capabilities that require a framing format that supports more flexible signalling and delivery mechanisms. Therefore, MPEG-2 systems (ISO/IEC 13818-1) specify the MPEG-4 LATM/LOAS framing format for MPEG-4 audio codecs to overcome the limitations of ADTS.

In order to be able to pass the MPEG-4 or MPEG-D audio bit stream from a set-top box to an A/V receiver connected via the IEC 60958 interface without needing to reframe the audio bit stream within ADTS, the MPEG-4 LATM/LOAS framing format needs to be supported by IEC 61937, including the high-speed transmission protocol where the interface does not carry an embedded sampling frequency clock.

~~INTRODUCTION to Amendment 1~~

~~The revision of IEC 61937-11:2010 has become necessary to specify the protocol where the interface does not carry an embedded sampling frequency clock. The purpose is primarily to support stereophonic multichannel audio applications increasing their channel counts. It is justified in that ARIB introduces 22.2/7.1 audio channel applications, as given in ITU-R BS.2051-0, into the market in 2018. This Amendment 1 contains the following significant technical changes with respect to IEC 61937-11:2010:~~

- ~~• new Annex B specifies new high speed transmission;~~
- ~~• the term "Sub data type" is discontinued.~~

DIGITAL AUDIO – INTERFACE FOR NON-LINEAR PCM ENCODED AUDIO BITSTREAMS APPLYING IEC 60958 –

Part 11: MPEG-4 AAC and its extensions and MPEG-D USAC in LATM/LOAS

1 Scope

This part of IEC 61937 describes the method to convey non-linear PCM bitstreams encoded in accordance with the MPEG-4 AAC format and its extensions (spectral band replication, parametric stereo and MPEG surround), and non-linear PCM bitstreams encoded in accordance with the MPEG-D USAC format, framed in MPEG-4 LATM/LOAS.

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.

~~IEC 60958 (all parts), Digital audio interface~~

IEC 60958-3:2021, *Digital audio interface – Part 3: Consumer applications*

IEC 61937-1:2021, *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 1: General*

IEC 61937-2:2021, *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 2: Burst-info*

ISO/IEC 14496-3:2009/2019, *Information technology – Coding of audio-visual objects – Part 3: Audio*

ISO/IEC 23003-3:2020, *Information technology – MPEG audio technologies – Part 3: Unified speech and audio coding*

INTERNATIONAL STANDARD

**Digital audio – Interface for non-linear PCM encoded audio bitstreams applying
IEC 60958 –
Part 11: MPEG-4 AAC and its extensions and MPEG-D USAC in LATM/LOAS**

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	7
3.1 Terms and definitions	7
3.2 Abbreviated terms	9
4 Mapping of the audio bit stream on to IEC 61937-1	10
4.1 General.....	10
4.2 Burst-info for MPEG-4 AAC and its extensions and MPEG-D USAC in LATM/LOAS.....	10
5 Format of data-burst for MPEG-4 AAC and its extensions and MPEG-D USAC in LATM/LOAS	10
5.1 General.....	10
5.2 Pause data-bursts for MPEG-4 AAC and its extensions in LATM/LOAS	11
5.3 Audio data-bursts.....	11
5.3.1 MPEG-4 AAC and its extensions in LATM/LOAS	11
5.3.2 USAC in LATM/LOAS.....	13
5.3.3 LATM/LOAS framing	14
5.3.4 Latency.....	15
Annex A (informative) Calculation of delay and data-burst repetition rates – guidelines.....	16
A.1 Examples	16
A.2 Guidelines.....	17
Annex B (normative) High-speed transmission.....	18
B.1 Indication	18
B.2 Example.....	18
Annex C (informative) MPEG-4 and MPEG-D audio profiles and audio object types.....	19
C.1 Overview.....	19
C.2 MPEG-4 AAC Profile	19
C.3 MPEG-4 High-Efficiency AAC Profile	19
C.4 MPEG-4 High-Efficiency AAC v2 Profile.....	19
C.5 MPEG-D Baseline USAC Profile	20
C.6 MPEG-D Extended HE-AAC Profile.....	20
Bibliography	21
Figure 1 – Data-burst structure.....	11
Figure 2 – Data-burst structure.....	13
Figure 3 – Latency diagram for burst reception and decoding.....	15
Figure C.1 – MPEG-4 /MPEG-D audio profiles structure	19
Table 1 – Values for data-type bits 0-4 and data-type bits 5-6.....	10
Table 2 – Repetition period of pause data-bursts	11
Table 3 – Data-type-dependent information for MPEG-4 AAC audio and its extensions in LATM/LOAS.....	12

Table 4 – Data-type-dependent information for USAC audio in LATM/LOAS	14
Table A.1 – Examples – Calculation of delay and data-burst repetition rates for AAC_LC and HE AAC	16
Table A.2 – Examples – Calculation of delay and data-burst repetition rates for USAC	17
Table B.1 – Indication fields	18
Table B.2 – Signalling example	18

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DIGITAL AUDIO – INTERFACE FOR NON-LINEAR PCM
ENCODED AUDIO BITSTREAMS APPLYING IEC 60958 –****Part 11: MPEG-4 AAC and its extensions
and MPEG-D USAC in LATM/LOAS**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 61937-11 has been prepared by technical area 20: Analogue and digital audio, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This second edition cancels and replaces the first edition published in 2010, and Amendment 1:2018. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) MPEG-D USAC has been added.

The text of this International Standard is based on the following documents:

Draft	Report on voting
100/3523/CDV	100/3582/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

A list of all parts in the IEC 61937 series, published under the general title *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958*, can be found on the IEC website.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

Modern digital video broadcasting standards, such as DVB, include support for the MPEG-4 HE AAC and/or HE AAC v2 audio codecs specified in ISO/IEC 14496-3. An increasing number of countries are adopting these new codecs for their standard-definition and high-definition digital video broadcasting services and have started with implementations.

For MPEG-2 AAC audio (ISO/IEC 13818-7), the specified framing format for the audio bit stream is ADTS and its transport over an IEC 60958 interface is specified in IEC 61937-6.

However, the MPEG-4 (ISO/IEC 14496-3) and MPEG-D (ISO/IEC 23003-3) audio codecs introduce new features and capabilities that require a framing format that supports more flexible signalling and delivery mechanisms. Therefore, MPEG-2 systems (ISO/IEC 13818-1) specify the MPEG-4 LATM/LOAS framing format for MPEG-4 audio codecs to overcome the limitations of ADTS.

In order to be able to pass the MPEG-4 or MPEG-D audio bit stream from a set-top box to an A/V receiver connected via the IEC 60958 interface without needing to reframe the audio bit stream within ADTS, the MPEG-4 LATM/LOAS framing format needs to be supported by IEC 61937, including the high-speed transmission protocol where the interface does not carry an embedded sampling frequency clock.

DIGITAL AUDIO – INTERFACE FOR NON-LINEAR PCM ENCODED AUDIO BITSTREAMS APPLYING IEC 60958 –

Part 11: MPEG-4 AAC and its extensions and MPEG-D USAC in LATM/LOAS

1 Scope

This part of IEC 61937 describes the method to convey non-linear PCM bitstreams encoded in accordance with the MPEG-4 AAC format and its extensions (spectral band replication, parametric stereo and MPEG surround), and non-linear PCM bitstreams encoded in accordance with the MPEG-D USAC format, framed in MPEG-4 LATM/LOAS.

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.

IEC 60958-3:2021, *Digital audio interface – Part 3: Consumer applications*

IEC 61937-1:2021, *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 1: General*

IEC 61937-2:2021, *Digital audio – Interface for non-linear PCM encoded audio bitstreams applying IEC 60958 – Part 2: Burst-info*

ISO/IEC 14496-3:2019, *Information technology – Coding of audio-visual objects – Part 3: Audio*

ISO/IEC 23003-3:2020, *Information technology – MPEG audio technologies – Part 3: Unified speech and audio coding*