# IEC 60958-4

Edition 2.1 2008-07

# INTERNATIONAL STANDARD

## Digital audio interface –
## Part 4: Professional applications

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE CH

ICS 33.160.30

ISBN 2-8318-9703-3

® Registered trademark of the International Electrotechnical Commission

# CONTENTS

INTRODUCTION ..... 5
1 Scope ..... 6
2 Normative references ..... 6
3 Terms and definitions ..... 6
4 Interface format ..... 6
4.1 General ..... 6
4.2 Validity bit ..... 6
5 Channel status ..... 7
5.1 General ..... 7
5.2 Professional linear PCM application ..... 7
6 User data ..... 15
6.1 General ..... 15
6.2 Application ..... 15
7 Implementation ..... 15
7.1 General ..... 15
7.2 Transmitter ..... 15
7.3 Receivers ..... 16
8 Electrical requirements ..... 16
8.1 General ..... 16
8.2 Balanced line ..... 16
8.3 Unbalanced coaxial cables ..... 21

Bibliography ..... 22

Figure 1 – Simplified example of the configuration of the circuit (balanced) ..... 17
Figure 2 – Intrinsic jitter measurement filter ..... 18
Figure 3 – Jitter attenuation mask (optional) ..... 18
Figure 4 – Eye diagram ..... 19
Figure 5 – A suggested equalizing characteristic for the receiver operating at a frame rate of 48 kHz ..... 19
Figure 6 – Receiver jitter tolerance template ..... 20

Table 1 – Channel status data format for professional linear PCM application ..... 8

INTERNATIONAL ELECTROTECHNICAL COMMISSION

# DIGITAL AUDIO INTERFACE –

# Part 4: Professional applications

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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
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.

International Standard IEC 60958-4 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

This consolidated version of IEC 60958-4 consists of the second edition (2003) [documents 100/643/FDIS and 100/669/RVD] and its amendment 1 (2008) [documents 100/1330/FDIS and 100/1355/RVD].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 2.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The main changes with respect to the previous edition (1999) are listed below.

– The scope specifies the professional application of IEC 60958-1 (generalities have been removed to an introduction).
– A clause on terms and definitions has been added.
– In Table 1, expanded channel status assignments have been added and channel status definitions expanded to accommodate extended sampling frequencies, indication of alignment level and multi-channel options.
– Figure 1 and associated text has been revised to be more generalized. Three notes on cable performance factors have been added.
– The impedance specification is now dependent on maximum frame rate.
– The common-mode balance specification is now dependent on maximum frame rate
– The impedance specification is now dependent on maximum frame rate.

IEC 60958 consists of the following parts under the generic title *Digital audio interface*:

Part 1: General

Part 3: Consumer applications

Part 4: Professional applications

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

A bilingual version of this publication may be issued at a later date.

# INTRODUCTION

The interface specified in this standard is primarily intended to carry monophonic or stereophonic programmes at a 48 kHz sampling frequency and with a resolution of up to 24 bits per sample. It may alternatively be used to carry signals sampled at other rates such as 32 kHz, 44,1 kHz, or 96 kHz. Note that conformity to this interface specification does not require equipment to utilize these rates and also that the capability of the interface to indicate other sample rates does not imply that it is recommended that equipment supports these rates. To eliminate doubt, equipment specifications should define the supported sampling frequencies.

The format is intended for use with shielded twisted-pair cables over distances of up to 100 m without transmission equalization or any special equalization at the receiver and at frame rates of up to 50 kHz. Longer cable lengths and higher frame rates may be used with cables better matched for data transmission, or with receiver equalization, or both.

In both cases, the clock references and auxiliary information are transmitted along with the audio data. Provision is also made to allow the interface to carry non-audio data.

# DIGITAL AUDIO INTERFACE –

# Part 4: Professional applications

## 1 Scope

This International Standard specifies the professional application of the interface for the interconnection of digital audio equipment defined in IEC 60958-1.

## 2 Normative references

The following referenced documents are indispensable for the application 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 60268-12:1987, *Sound system equipment – Part 12: Application of connectors for broadcast and similar use*

IEC 60958-1, *Digital audio interface – Part 1: General*

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

ISO/IEC 646:1991, *Information technology – ISO 7-bit coded character set for information interchange*

ITU-T Recommendation J.17:1988, *Pre-emphasis used on sound-programme circuits*

ITU-T Recommendation V.11:1996, *Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s*