

# TECHNICAL SPECIFICATION

# IEC TS 62312-2

First edition  
2007-06

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## Guideline for synchronization of audio and video – Part 2: Methods for synchronization of audio and video systems

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## CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references .....	6
3 Terms and definitions .....	6
4 System model.....	7
4.1 Audio video system .....	7
4.2 Latency and delay .....	7
4.3 System model .....	7
4.4 Audio and video device .....	8
4.5 Controller .....	9
4.6 Source device and display device.....	9
4.7 Controller function of audio and video device .....	10
5 Methods for synchronization.....	11
5.1 Information for synchronization.....	11
5.1.1 Time-code information.....	11
5.1.2 Latency information.....	11
5.2 Methods for synchronization.....	11
5.2.1 General .....	11
5.2.2 Method with time-code information.....	13
5.2.3 Method with latency information .....	14
5.3 Method with IEC 60958-3.....	14
5.4 Method with IEC 61883-6 .....	14
5.5 Method with other interface specifications .....	15
Bibliography.....	16
Figure 1 – System model.....	7
Figure 2 – Audio and video device .....	8
Figure 3 – Information and control in audio and video device.....	9
Figure 4 – Source device .....	10
Figure 5 – Display device.....	10
Figure 6 – Audio amplifier .....	10
Figure 7 – Controller function of audio and video device .....	11
Figure 8 – Additional delay .....	12
Figure 9 – Multiple reproductions .....	13

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**GUIDELINE FOR SYNCHRONIZATION OF AUDIO AND VIDEO –****Part 2: Methods for synchronization of audio and video systems**

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Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62312-2, which is a technical specification, has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
100/1195/DTS	100/1226/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

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

The list of all the parts of IEC 62312, under the general title *Guideline for synchronization of audio and video*, can be found on the IEC website.

The committee has decided that the contents of this publication 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

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

## INTRODUCTION

Audio, video and multimedia systems and equipment have begun to use digital technologies. Digital systems or equipment may cause delay of audio and video signals because digital signal processing causes latency and delay. The unevenness of the delay between audio and video may cause synchronization problems.

For instance, a digital broadcasting system uses signal compression of audio and video. A receiver has signal decoders, and this may cause unevenness of the delay between audio and video. Digital video signal processing of display causes a significant delay in the reproduction time of the video image. Another example is an audio video system consisting of a digital media player, an audio amplifier and display. A digital media player outputs audio and video signals separately to the amplifier and display through digital interfaces. This may cause synchronization problems of audio and video when each processing time of the equipment is different.

To solve synchronization problems, this technical specification gives guidelines for general methods for the synchronization of audio and video.

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# **GUIDELINE FOR SYNCHRONIZATION OF AUDIO AND VIDEO –**

## **Part 2: Methods for synchronization of audio and video systems**

### **1 Scope**

The IEC 62312 series gives guidelines for methods of synchronization of audio and video.

This part of IEC 62312 describes the system model and general methods for the synchronization of audio and video. The methods exclude the synchronization of the signal source and the spatial delay of audio reproduction.

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

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

IEC 61883-6, *Consumer audio/video equipment – Digital interface – Part 6: Audio and music data transmission protocol*

### **3 Terms and definitions**

For the purposes of this document, the following terms and definitions apply.

#### **3.1**

##### **latency**

inevitable delay of signal that is caused by principle or unavoidable signal processing

#### **3.2**

##### **delay**

general meaning of delay other than latency, including delay that is caused by functional signal processing and delay that is set intentionally

#### **3.3**

##### **latency information**

information of the sum value of latency and delay

#### **3.4**

##### **time stamp**

quantized timing in which an event occurs on the basis of a reference clock



## 4 System model

### 4.1 Audio video system

An audio video system consists of audio and video devices and these devices may include digital signal processing that causes latency and delay. Each device is connected to the other device by analogue or digital signal interfaces. The final outputs from the audio video system to the user are reproduction of audio with speakers and visual image with display device. These reproductions have no information of synchronization and the method for synchronization should be applied at the stage prior to the final reproduction.

To control synchronization of audio and video, synchronization information should be provided, and the controller should control the delay of the audio and video devices with the synchronization information. The synchronization information and the controller signal are transmitted through digital interfaces or control line.

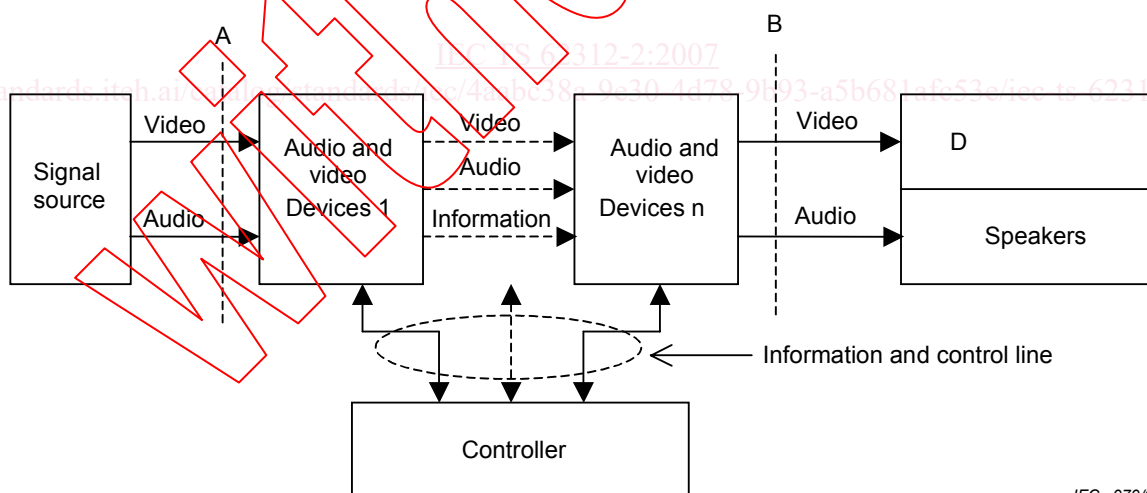
### 4.2 Latency and delay

Latency means an inevitable delay of signal in the audio and video device that is caused by principle or unavoidable signal processing. For instance, signal encoding and decoding, signal compression and de-compression, and signal transmission through interface cause latency.

The term “delay” is sometimes used as meaning latency. In this technical specification, “delay” is defined as delay other than latency. Functional signal processing causes delay or delay is set intentionally.

### 4.3 System model

Figure 1 shows the system model.



IEC 979/07

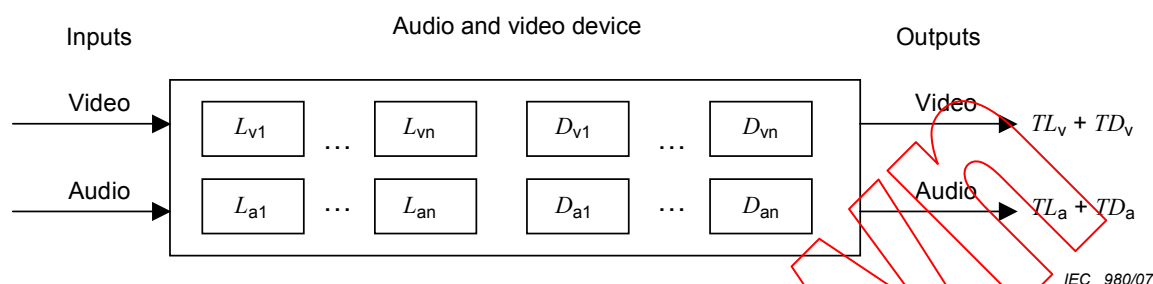
**Figure 1 – System model**

In this system model, audio and video synchronization of the signal source is outside the scope because this model cannot identify it or control it. The audio and video devices have latencies and delays because of their structure. The system consists of a number of audio and video devices. The display unit is a visual reproducer such as CRT or a flat panel display device. The speakers are audio reproducers. These display unit and speakers are defined as an ideal device that has no latency. A spatial delay of audio is outside the scope. The lines A and B show the border of the control of synchronization, the controller controls latency and delay in the audio and video devices with the synchronization information.

#### 4.4 Audio and video device

The audio and video device is defined as a device consisting of audio and video units. Each unit includes latency and delay.

Figure 2 shows a model for audio and video device. This audio and video device consists of units that have latencies and delays and signal inputs and outputs.



**Figure 2 – Audio and video device**

The latency of the unit is defined as  $L_{vn}$  for video and  $L_{an}$  for audio, and the delay of the unit is defined as  $D_{vn}$  for video and  $D_{an}$  for audio

where

$n$  is a numeric number of units;

$L_{vn}$  is the video latency of the video unit number  $n$ ;

$D_{vn}$  is the video delay of the video unit number  $n$ ;

$TL_v$  is the total latency of video;

$TD_v$  is the total delay of video;

$L_{an}$  is the audio latency of the audio unit number  $n$ ;

$D_{an}$  is the audio delay of the audio unit number  $n$ ;

$TL_a$  is the total latency of audio;

$TD_a$  is the total delay of audio.

The total value of latency and delay is the sum of each value.

$$TL_v = L_{v1} + L_{v2} + \dots + L_{vn}$$

$$TD_v = D_{v1} + D_{v2} + \dots + D_{vn}$$

$$TL_a = L_{a1} + L_{a2} + \dots + L_{an}$$

$$TD_a = D_{a1} + D_{a2} + \dots + D_{an}$$

To control synchronization of audio and video, the audio and video devices should have the information and control function that processes the synchronization information and control delay.

The information and control function of the audio and video device is described in Figure 3. This is a general model that is applied for both the audio part and the video part independently.