STANDARDS AND INFORMATION DOCUMENTS

AES-21id-2011

AES Information Document for audio-file transfer and exchange - Screen-less navigation for high-resolution audio on Blu-ray Disc

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Abstract

High-resolution audio, presented as uncompressed LPCM, has been waiting for a suitable transport format for some time. The Blu-ray Disc (BD) format offers such a transport and supports the necessary linear and lossless codecs as part of its basic specification. While many BD players can be found in home theatre and games environments, there are some issues that need to be addressed before they can be introduced into a hi-fi environment that does not have a screen to present visual menus for audio stream setup and track selection. This recommended method specifies a structure for authoring a BD ROM to enable playback in screen-less consumer systems, and to provide simple track selection from the remote control.

Contents

Foreword

This foreword is not part of AES-21id-2011 *AES Information document for audio-file transfer and exchange - Screen-less navigation for high-resolution audio on Blu-ray Disc™*.

This document was instigated by AES President Jim Anderson in the spring of 2009 with the intent to harmonise a simple technique for distributing high-resolution audio in a way that did not require changes to existing consumer electronics and that could be used with a wide range of existing hardware in the field. A proposal from Stefan Bock was accepted by the AESSC as project AES-X188, *Screen-less navigation for high-resolution audio on Blu-ray Discs* and was assigned to working group SC-02-08 on Audio-File Transfer and Exchange who contributed to the development of the draft.

Mark Yonge
Chair, working group SC-02-08 on Audio-File Transfer and Exchange

NOTE This document was published as a Call for Comment identified as AES-17id-xxxx. Following a comment pointing out the risk of confusion between its assigned number and an established document (AES17, Measurement of digital audio equipment), this document was re-numbered AES-21id.

Note on normative language

In AES standards documents, sentences containing the word “shall” are requirements for compliance with the document. Sentences containing the verb “should” are strong suggestions (recommendations). Sentences giving permission use the verb “may”. Sentences expressing a possibility use the verb “can”.

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0 Introduction

0.1 Background

From the time of its general introduction in 1983, Compact Discs and CD players have become a familiar part of consumer hi-fi systems. The method of operation has been consistent during that period: put a disc in the tray; accept track 1 by default or select another; press Play. No other setup was expected or available.

The DVD was introduced in the late 1990s primarily to carry movies as a replacement for consumer videotape formats. All user interaction was intended to be directed by a remote control, with visual feedback from the screen that was automatically available in a home-video system. High-resolution audio was not a primary factor in the initial design of DVD, in part because the data capacity of a DVD, although considered large at the time, was insufficient to carry multi-channel uncompressed LPCM (for example).

The introduction of the Blu-ray disc (BD) format in 2006 offered sufficient data capacity for high-resolution audio to be considered practically and without compromise. More importantly, the basic specification of the BD included a wider range of lossless audio coding options, including up to 8 channels of high-resolution LPCM, as shown in table 1.

Table 1 - Supported audio formats

Codec	Sampling frequency (kHz)	Max. channels
Linear pulse code modulation (LPCM)	48, 96, [192]	8 [6]
Dolby True HD	48, 96, [192]	8 [6]
DTS-HD	48, 96, [192]	8 [6]

0.2 Obstacle to progress

Like their DVD precursors, BD players are designed to be used in conjunction with a video screen, and so screen-based visual feedback was again assumed for operational control. While this will be satisfactory for some users, many audio users will still prefer the simplicity of CD operations. Additionally, in many consumer hi-fi systems, there will be no existing screen and the extra cost of providing a screen just to see the menu could make the high-resolution audio proposition impractical.

0.3 Proposed solution

It is possible, without making any changes to the BD player, to provide the necessary functionality for screen-less playback of high-resolution audio. The necessary functionality can be provided using programming that is included at the authoring stage of the disc.

The screen-less modes described here are a function of programming during the disc mastering stage. They use the standard BD capabilities and do not seek to limit them in any way.

0.4 Patent statement

The Audio Engineering Society draws attention to the fact that it is claimed that implementation of this AES information document may involve the use of a German patent, Gebrauchsmusterschutz Nr. 20 2009 003 969.2.

The AES holds no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the AES that it is willing to negotiate licenses under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is archived with the AES.

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Attention is drawn to the possibility that some of the elements of this AES information document may be the subject of patent rights other than those identified above. AES shall not be held responsible for identifying any or all such patent rights.

1 Scope

This information document recommends a method for authoring a BD ROM to enable playback in consumer systems without a video screen, and to provide simple track selection from the remote control.

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.

There are no normative references

3 Terms and abbreviations

3.1 Blu-ray Disc
BD
optical disc format specified by BDA. See annex D

3.2 Blu-ray disc player
BDP
playback reproducer for Blu-ray Discs

NOTE Blu-ray Disc™ and Blu-ray™ are trademarks of the Blu-ray Disc Association (see also annex D)

4 Visual and other non-audio content

4.1 General

All possibilities within the normal BD specification are supported in this information document. This recommended method provides additional functionality.

Users with video screens cannot be expected to tolerate a blank screen. Some users may prefer to include a screen to display menus and navigational information for their audio system (see annex B). Some screens in these cases may be much smaller than a full-size screen for home theatre.

The authored disc should provide sufficient visual content to at least identify the audio content of the disk. The programmer should consider the legibility of menu content when reproduced on a small screen.

5 Stream selection

5.1 General

A BD can contain more than one audio stream. When appropriately authored, a BD is able to provide different versions of the same recording in different audio formats. This enables, for example, a two-channel stereo mix to be provided for conventional hi-fi users, plus surround versions for users with the necessary playback facilities. Formats such as 7.1 surround are being considered; and other formats can be expected to appear in due course.

It is possible to select the preferred stream at any time using the on-screen menu. For screen-less operation, an alternative operation is needed.

5.2 Remote buttons

Java programming will be required to switch between multiple audio streams using the coloured buttons on the remote control.

Every BD remote control contains 4 programmable buttons identified by a numbered code internally and by a colour to the user: Red, Green, Yellow, and Blue. The visual sequence of these coloured buttons may differ from territory to territory, however the assignment of colours to numbers is handled internally.

Each coloured key should be associated with an audio stream. Pressing a button of a certain colour should select its associated audio stream (see stream options, later).

The on-screen display should confirm the current stream status at all times.

5.3 Stream options

It is expected that all audio in a high-resolution-audio BD will use either direct LPCM coding or a form of lossless compression. The main discriminating factor between streams will then be the channel format.

The authored disc should contain at least 1, and up to a maximum of 4, audio streams.

Where available, audio streams should be selected according to table 2.

Table 2 - Remote-control button assignments

Button colour	Stream
Red	5.0, 5.1
Green	7.0, 7.1
Yellow	2.0 (stereo)
Blue	Not defined

The default stream should be 5.0 or 5.1, but may be any other format. Where different stream options are included, this should be clearly stated on the label. When switching streams playback should continue from the same time position as closely as possible.

NOTE It is possible for multiple complex formats to exceed BD bandwidth limits. It may still be possible to accommodate all these tracks by using, for example, multiple playlists.

6 Track numbers

Content elements on a BD are not inherently numbered in the same way as the tracks of a conventional audio CD. To provide this simple means to identify pieces of music, for example, it will need to be programmed.

During the authoring stage, numbers should be assigned to audio tracks.

Audio tracks should have numbers starting at 1. The same numbers should identify the same content for all streams.

Skip-forward and skip-backwards keys should cause the BDP to jump between tracks (or chapters) monotonically.

Note that fast forward and reverse keys will only work where a video stream is included. A still frame will cause these functions to fail.

7 Pause on load

By convention, a BD will automatically play as soon as possible after loading. The disc should be programmed to pause on load, or before playing the first audio track, so that the appropriate stream can be selected without interrupting the first track.

Annex A - Java

A.1 Program optimisation

Programming should optimise for maximum speed of loading.

Annex B - On-screen audio displays

B.1 General

For people that do have a screen - there needs to be some visual content (see 4.1). This should include the following elements.

B.2 Menu

The normal BDP menu functions.

B.3 Tracklist selector

A basic tracklist should display a graphics array representing the audio tracks on the authored disc. A series of rows, each containing 3 or 4 square cells, should contain numbers starting with 1 at the top-left cell, incrementing to the right.

These graphics should confirm the currently selected track at all times.

B.4 Stream selector

The on-screen audio setup display should display the available audio formats and allow selection between them. These graphics should confirm the currently selected format at all times.

B.5 Additional graphics

Additional graphics may include track lists and other information.

Annex C - Sample material

Examples of commercially-available discs using this method.

***In folk style,* Trondheim Solistene**. Catalogue No. 2L-068-SABD; ISRC-code NOMPP1006010-150,
2L, c/o Lindberg Lyd AS, PO Box 56, Bogerud, NO-0621, Oslo, Norway. web: www.2l.no/

***Missa Solemnis,* Ludwig van Beethoven**. No. A 108 054,
FARAO Classics, Munich, Germany. web: www.farao-classics.de/english/english.html

***Mozart/Grieg, vol II,* dena piano duo**. Catalogue No. 2L-057-SABD; ISRC-code NOMPP0809010-090
2L, c/o Lindberg Lyd AS, PO Box 56, Bogerud, NO-0621, Oslo, Norway. web: www.2l.no/

***Piano Concerto,* Edvard Grieg.** Catalogue No. 2L-060-SABD; ISRC-code NOMPP0903010-110
2L, c/o Lindberg Lyd AS, PO Box 56, Bogerud, NO-0621, Oslo, Norway. web: www.2l.no/

***Violin Concertos,* Ole Bull**. Catalogue No. 2L-067-SABD; ISRC-code NOMPP1004010-100.
2L, c/o Lindberg Lyd AS, PO Box 56, Bogerud, NO-0621, Oslo, Norway. web: www.2l.no/

Annex D - Bibliography

The following document has served as a reference for AES-21id-2011

System specification, Blu-ray disc, Read only format, Part 3: Audio visual basic specifications - V2.4. Blu-ray Disc Association, www.blu-raydisc.info

This document is available under license from the Blu-ray Disc Association www.blu-raydisc.com/.